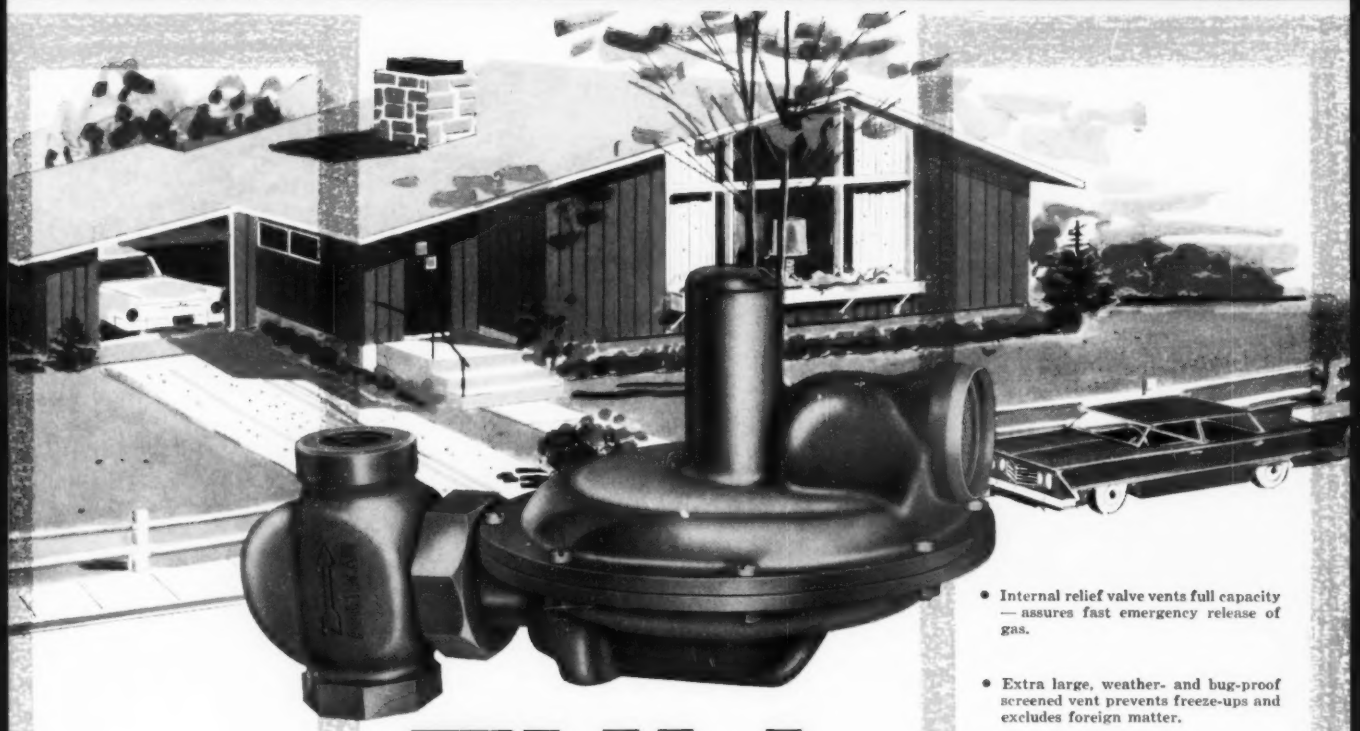
GAS

NOVEMBER 1959

An approach to remote control

A CHILTON PUBLICATION

THE NATION'S NATURAL GAS AUTHORITY



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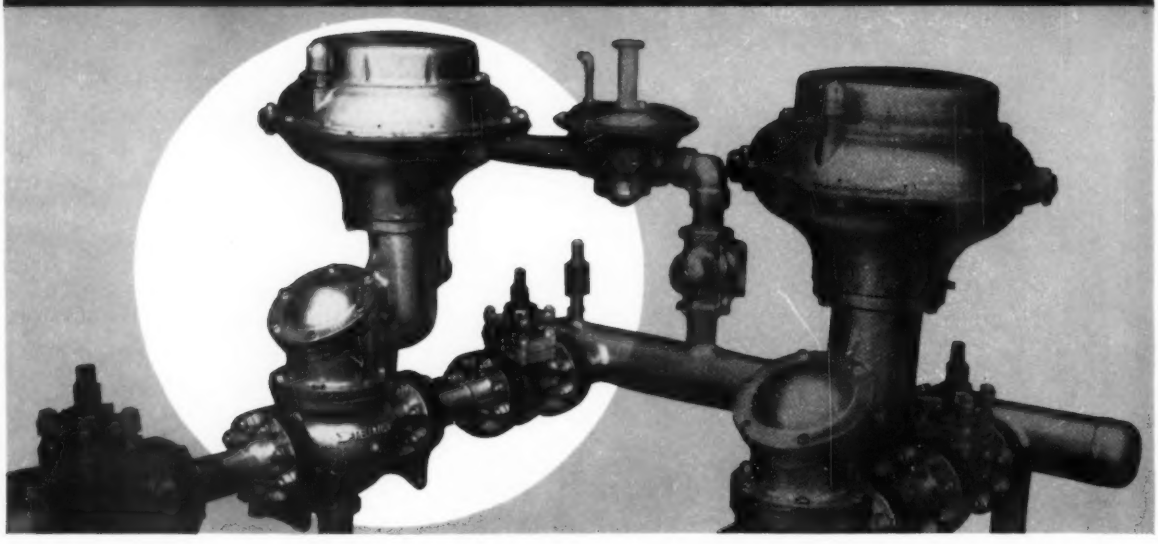

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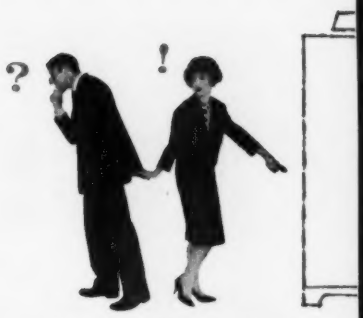

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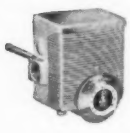

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GAS

CONTENTS

NOVEMBER 1959

35TH YEAR OF PUBLICATION

VOLUME THIRTY-FIVE · NUMBER 11

FEATURES

Quigley station: A Pacific Lighting approach to remote control
Part 1. Southern California's facilities 57
By D. C. Anderson

New radiant heater developed 69

AGA reports on industry construction 71

Locating nonmetallic pipe 73
By George M. MacLeod

PIPELINE SECTION

Quigley station: A Pacific Lighting approach to remote control
Part 2. PLGS' facilities 103
By H. L. Clark

Spanning the Narrows 114
By M. Anuskiewicz Jr.

Gas measurement thoughts to ponder..... 118
By J. Fred Ebdon and Friends

DEPARTMENTS

Editorial Comment—

Thermally Thinking, *by J. Fred Ebdon*.... 6
Highlights 8
Regulatory and Legislative Trends 11
Technical Trends, *by Guy Corfield* 15
Washington, *by Neil Regeimbal* ... 17
Corrosion Prevention, *by Marshall E. Parker* 19
Communications, *by Frank Chapman*... 126

News developments—

California standardizes extension practices ... 74
Houston's Miami franchise delayed 77
Lone Star sharing gas with Oklahoma Natural 134
Construction dollars top '51 136
Pipeline controls sought in Arkansas 138

Departments—

Calendar 44
Digest of New Products and Trade Literature.. 80
Associations 88
People 94
Pipeline People 144
Advertisers Index 146

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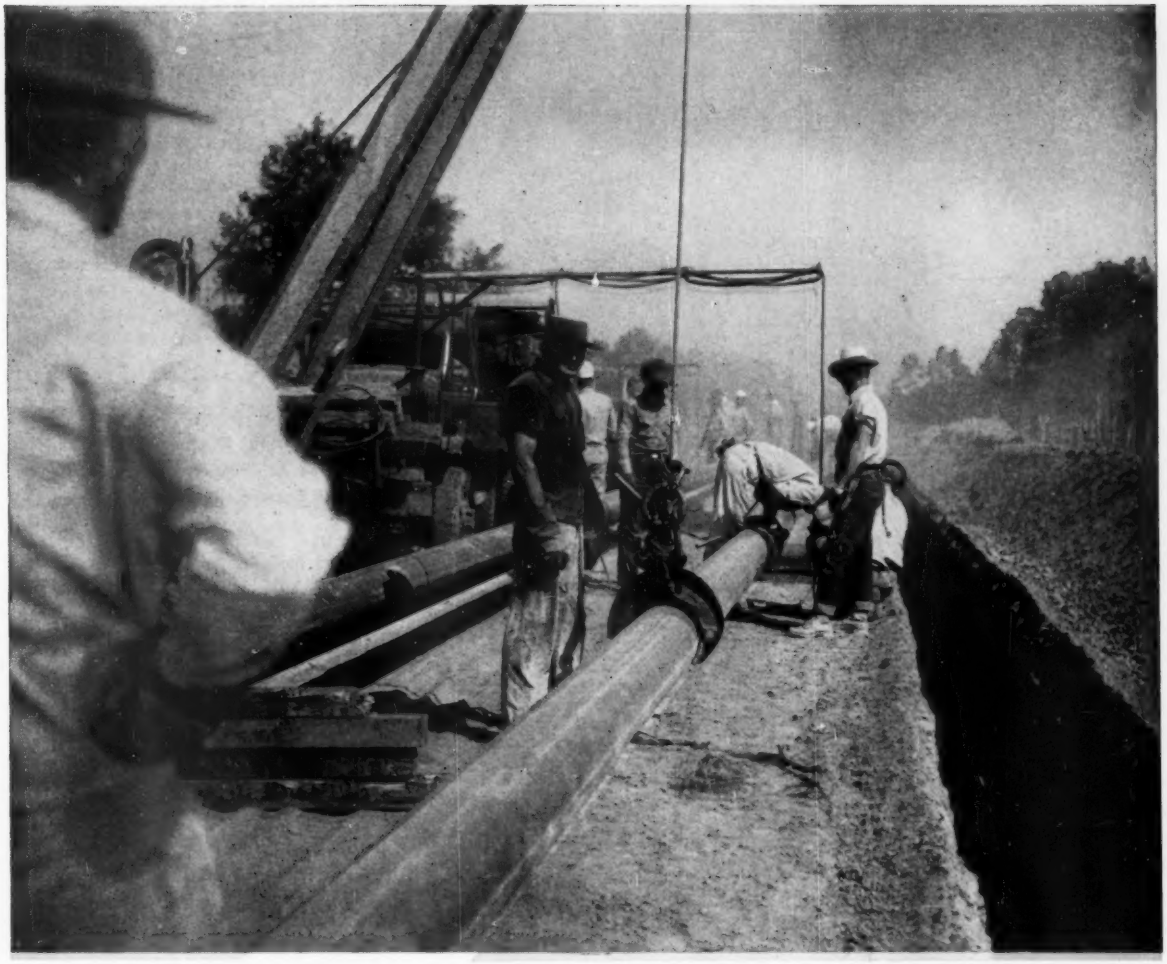

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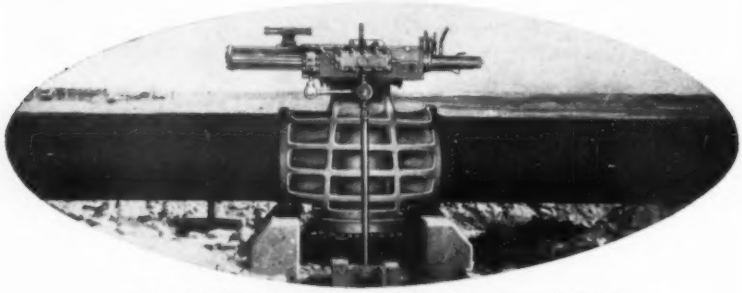

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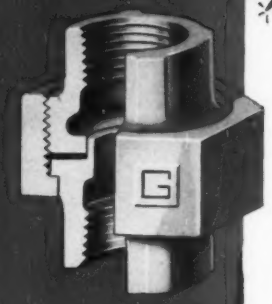
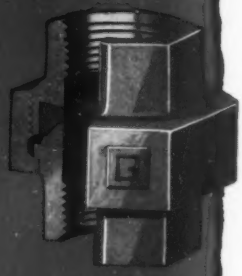


Malleable Iron Standard Union (Gasket Type)



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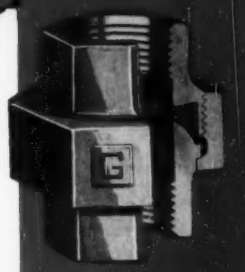

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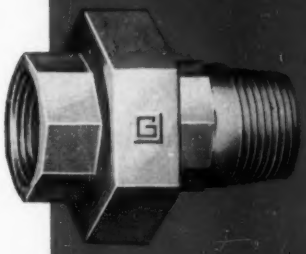

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• Brass Insert Seat
• Tested Railroad Type
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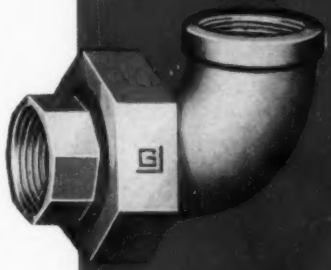

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NOVEMBER 1959

Thermally Thinking

THE gas industry is no stranger to sharp corners of transition. It has not escaped the peculiar dilemma that has confronted man since he learned to control the energies of steam, oil, electricity, natural gas and now atomic reaction. In fact, there could be raised—with some validity—the question: Does man know what to do with natural gas now that he has learned through creative thinking how to use it?

The gas industry does have the physical side of using gas reduced to a pretty conclusive science through thinking and development of equipment and machines. I would not care to even imply that his progress has eliminated need for further development and better ways.

But the complexities of bringing the physical gas properties and operations to full, efficient fruition do seem to enhance the thought that we really might not know just what to do about this marvelous energy source man has developed.

There are many ways that I could expand this thought. I am sure that you can do the same and probably do a better job of it in addition. However, one transition that hits me is the matter of the Richfield Oil Corp. and Southern Counties Gas Co.

It seems that Southern California Edison Co. (an electric utility) wants a supply of natural gas in addition to those ever-expanding supplies furnished by Southern Counties and Southern California Gas companies. Edison considers the gas companies' interruptible service unsatisfactory. This is ridiculous, in my opinion. Edison also wishes to avoid use of fuel oil for stand-by service because of air pollution factors.

Richfield and Edison signed a contract for the former to supply the latter with natural gas at Mandalay station. Southern Counties filed a complaint with the California PUC. They also sought a court injunction to stop Richfield from building a 56-mile pipeline to deliver the gas. The court held that PUC had jurisdiction. Richfield declined to submit to the jurisdiction of California's PUC.

Came Aug. 4 and the Cal-PUC said to Richfield that it was found to be a public utility gas corporation, but it did not order the oil company not to build the pipeline. The pipeline was built. Then, on Oct. 9, the PUC handed Richfield a cease and desist order. The order stipulated that neither Richfield nor any other party introduced sufficient evidence to show that public convenience and necessity require continued operation and maintenance of Richfield's gas pipeline and the delivery and sale of its gas to Edison for use as boiler fuel at the generating plant.

Therefore, it was ordered that Richfield quit selling gas to Edison at Mandalay and to cease operating and maintaining the San Joaquin valley-to-Mandalay pipeline. They were given 20 days before the order became effective.

It is an interesting triangle, indeed. A triangle of energy merchants — an electric utility, a gas utility, and an oil company. Perhaps it is a pity that these companies didn't work together better to help solve the problem of energy supply to the vast, growing southern California area.

A gas company produces a commodity that is essential to ordinary consumers' standards of living. Hence, it is classed as a public utility. Regulation is substituted for the market process. The objectives of regulation are to permit appropriate expansion of capacity, limitation of profits, access of all consumers to supply, and development of some kind of relationship between supply and price. To operate thusly, you have to have a "natural" monopoly or you usually have waste.

In any case, a company forced to operate under complete regulation as a public utility cannot be expected to sit back while every Tom, Dick, and Richfield Oil merrily builds a pipeline into its service area.

I guess we have only seen the beginning. As man continues to think and develop tools that will very nearly think for him, he will continue to snarl himself in traffic jams on the avenues toward improvement. As computers and machines and tools continue to extend man's inherent capabilities, it will be fascinating to see the problems he winds up with.

J. Fred Ebdon

EDITOR

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GAS HIGHLIGHTS

Seaton's Sayings

Interior's Seaton told the AGA Convention in Chicago that the gas industry should take the lead toward developing new natural gas legislation. But gas industry spokesmen have said presidential backing is necessary in winning passage through Congress. Delegates wondered if the Secretary's remarks indicated administration backing for a natural gas bill. He also called for statesmanship from inside government and from the gas industry.

Quebec Natural to Grow

A $44-million construction program for expansion and improvement of natural gas system between now and 1963 if demand growth continues at its current rate, is predicted for Quebec Natural Gas Corp., Montreal. This company was a gov't.-owned utility that switched to an investor-owned property. Their DDD's are 56 per cent higher than New York City.

Richfield Rocked by PUC

After finding Richfield Oil Corp. to be a public utility gas corporation on Aug. 4, the California Public Utilities Commission, on Oct. 9, ordered Richfield to cease selling natural gas to SoCal Edison Co.'s Mandalay steam-electric generating plant. The order also directed the oil company to cease operating and maintaining the pipeline to the plant.

Intrastate Gas

Humble Oil & Refining Co. (Houston) has started delivery of natural gas through a 283-mile, 30-in., 330-MMcfd (later 600 MMcfd), intrastate pipeline. No FPC approval was sought. Fuel is moving from fabled King Ranch to industrial customers in the Houston-Baytown-Beaumont-Port Arthur area.

FPC Hears Important Plea

Francis H. Crissman, VP for The Columbia Gas System, Inc., recently told FPC that rising interest rates, insufficient return, and delay in settling rate cases threaten to block future construction needed to meet growing consumer demand. The hearings involved a Columbia subsidiary which has compromised for a 6.5 per cent return instead of the 6.75 per cent asked. FPC, in 1953, set 6.25 per cent for the Columbia group. Crissman said the 1953 figure is no longer adequate nor is the 6.5. He showed that Columbia must have almost 7 per cent to do nothing more than meet earnings requirements of the Indenture, for 1959-63.

Puget Sound Grows Too

Washington Natural Gas (Seattle) sees a 1960 construction program comparable to '59 budget ($7,542,000) and the addition of 12,000 new customers. New domestic, industrial conversion, and industrial uses are building the load on the system from Everett to Olympia.

A major new natural gas supply began flowing into the greater Chicago-Gary area on Oct. 7. Midwestern Gas Transmission Co. put its Portland, Tenn., to Joliet, Ill., newly constructed line in operation on that date.

Midwestern Flows

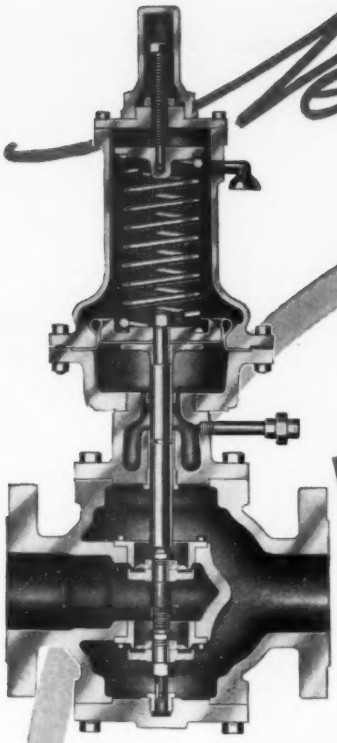
Midwestern (a Tennessee Gas Transmission subsidiary) will deliver 200 MMcfd to Northern Indiana Public Service; 100 MMcfd to The Peoples Gas Light & Coke Co.; and 60 MMcfd to Northern Illinois Gas Co. through the new system. Gas supply is from both onshore and tidelands wells in the prolific Texas and Louisiana Gulf Coast area. It flows to Midwestern through the multi-pipeline TGT system.

Still pending is Midwestern's application to FPC to build a 504-mile, 24-in. project to bring new Canadian gas supply to communities in Minnesota and Wisconsin.

CIG Goes Solid State

Colorado Interstate Gas Co. (Colorado Springs) will use a solid state remote control system to operate its Springfield, Colo., compressor station from its "Springs" headquarters. The SIE-made unit will go in on a pilot basis. It is believed that this will be the first application of a solid-state electronic remote control system to a natural gas pipeline.

New in principle!



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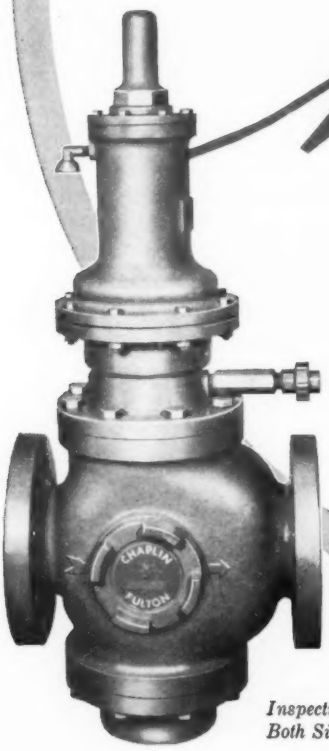

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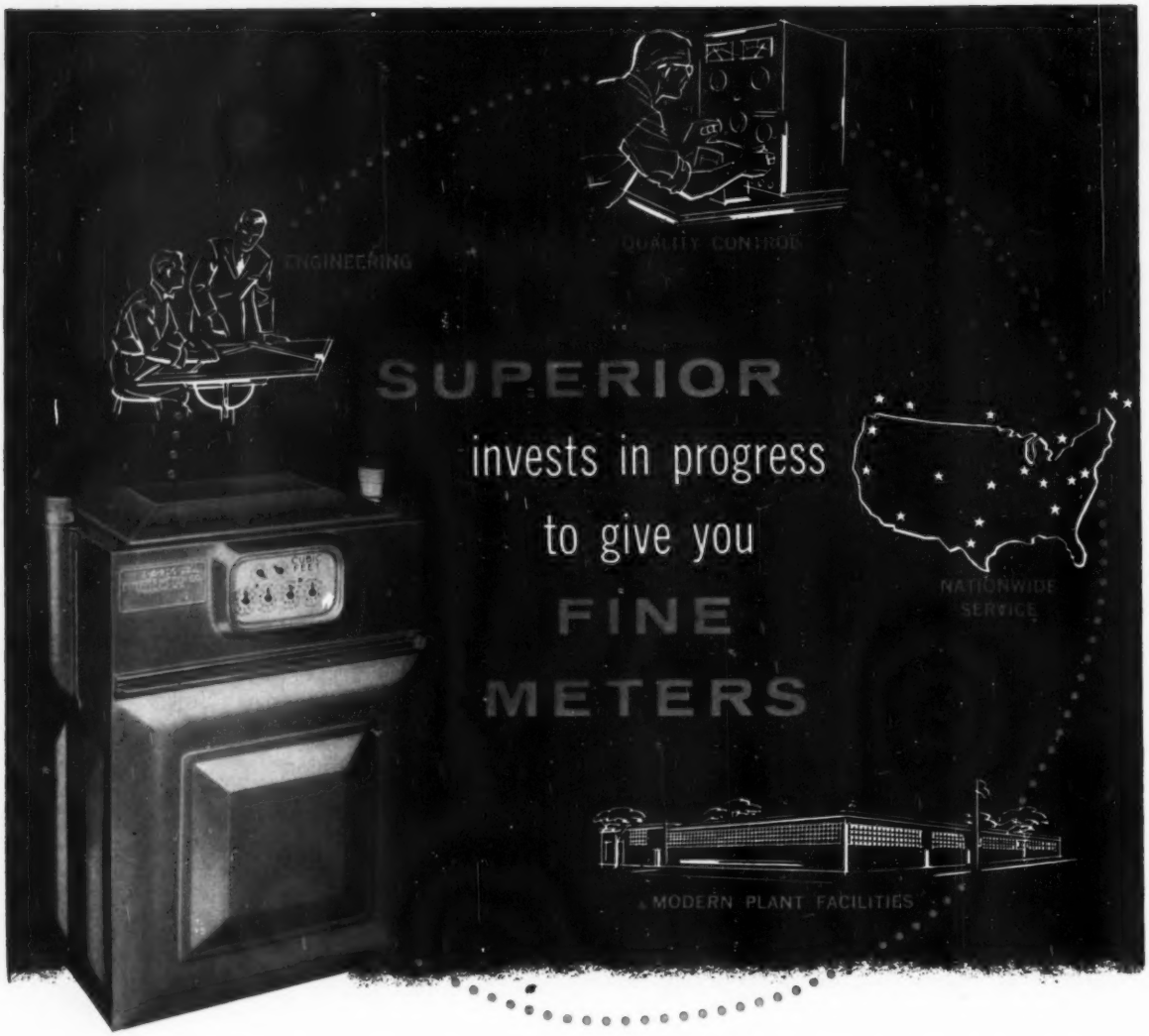

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16

Regulatory and Legislative Trends

A COMMENTARY ON NATIONAL AND STATE DEVELOPMENTS BY AN EXPERT IN UTILITY LAW

Gas transport can win FPC approval

FPC authorized two interstate pipeline companies to build facilities costing $42 million to transport 100 MMcf daily of natural gas for reasonable rates from Louisiana to the Hope Natural Gas Co. in West Virginia. Hope purchased most of the gas and produced the remainder in Louisiana. It will sell the transported gas to its operating affiliates — East Ohio Gas Co., Peoples Natural Gas Co., River Gas Co., and New York State Natural Gas Co.—for local distribution.

This FPC decision may have surprised some members of management, who saw the cloud cast over gas transportation arrangements earlier in 1959 in the Transco case. The Hope decision was really a clarification of public policy announced by FPC in the Transco case. The commission asserted in the Hope case that ". . . this is not the type of transportation arrangement to which we objected in our Opinion No. 315-A (Transco) for here there is no proposal to make non-jurisdictional purchases and reserve a portion of a pipeline's capacity for an inferior end use." In the Transco certificate case Consolidated Edison bought gas from producers in Texas and hired Transcontinental Gas Pipe Line Corp. to transport it to New York for use as boiler fuel in Con Ed's electric generating plant. FPC denied a certificate to Transco, and that case is pending in the Circuit Court of Appeals.

Now we know that certain types of gas transportation arrangements can win FPC approval, especially when FPC has jurisdiction over the price of the gas sold for resale.

• Difference between Hope and Transco

FPC found that Hope did not pay unreasonable prices to the independent producers in Louisiana for the gas. Also, FPC concluded that the entire project is subject to its jurisdiction over pipeline facilities and rates, and that the additional gas will be distributed by Hope throughout the Consolidated System for the same type of services which the System has rendered for a half century.

By contrast in the Transco certificate proceeding, FPC rejected the project because: (1) It did not have jurisdiction over the price paid to Texas producers by Con Ed for gas it would burn as boiler fuel; (2) approving the transportation arrangement would encourage others to bid up the price of gas unnecessarily in the field; (3) the use of gas by Con Ed for boiler fuel was an end use considered to be "something less than desirable"; and (4) the transportation service would grow to pre-empt pipeline capacity which would be available otherwise for more beneficial public needs.

• Fourteen-year gas supply adequate

FPC knows that deliverability is controlling and it decided that a 14-year gas supply was adequate to justify the proposed pipeline expansion in the Hope case. The commission stated:

"Our staff has raised the point that there may be some question as to the adequacy of Hope's newly obtained gas supplies to justify the expansion of the Texas Gas and Texas Eastern systems. If Hope takes delivery of its full 100 MMcf per day, the evidence shows that there will be a reserve life index of approximately 16 years and a deliverability life of over 12 years. If Hope is unable to take 100 MMcf per day for 365 days per year, as the evidence indicates may be the situation, these figures will be increased up to two years both as to reserve and as to the deliverability. In addition to this, Hope's claimed reserves include only those reserves available from 7000 acres of the 35,000 dedicated under the producer contracts. This additional acreage is in a highly productive area where further development will undoubtedly result in increasing Hope's available supplies.

"In our Opinion No. 321, issued May 22, 1959, we granted authorization to Trunkline Gas Co. to expand its system upon a showing of 11.5 to 13 years deliverability life. On May 12, 1959, in Opinion No. 320, we permitted Tennessee Gas Transmission Co. to expand its system on a showing of a deliverability life of 11 years. While we consider these figures to be the minimum we can permit, we also consider that for established companies with a proven ability to attach new sources, such as is the case here, this minimum will support an expansion program."

• Supreme Court tests applied to producers' prices

In the famous CATCO decision by the U. S. Supreme Court, several weeks before the FPC decided this Hope certificate case, certain tests were prescribed for producers' initial prices. It is enlightening to study the analyses made by FPC in reaching the conclusion that the prices charged Hope by the producers did not warrant a condition on the certificate fixing prices below the contract levels.

Hope will produce about 4 per cent of the gas supply obtained for this project. The remainder will be purchased from 21 independent producers under 26 contracts. These contracts call for initial prices of 21 cents per Mcf for about 5 per cent of the volumes dedicated and 21.5 cents per Mcf for the remaining 95 per cent. These prices are exclusive of reimbursement of the Louisiana severance tax. The contracts also call for periodic increases of 1 cent every four years and for price redeterminations after eight years in some cases and after 12 years in others. There are no favored-nation clauses in the contracts, and the evidence clearly discloses that they were made after a long period of arm's-length bargaining. Such contracts with their relatively firm price provisions will not result in any immediate increase in Hope's prices to its customers, and they give Hope the advantage of having fixed purchase prices over a fairly long period of time.

The prices in the proposed producer sales will have no adverse effect on any other purchasers in southern Louisiana. The prices to be paid by Hope will set no new plateaus either offshore or in the onshore fields. Numerous unconditioned sales are already being made at and above the proposed prices and many of the contracts call for 2-cent increases every four years and contain favored-nation and redetermination clauses. These are the first purchases by Hope in this area and no favored-nation clauses will be triggered, either to Hope or to other purchasers. The evidence shows that these sales will be sufficient to cover normal requirements of the Consolidated System for about one year.

FPC declared that: "We are in complete accord with the view of the New York Commission and our staff that the prices at which the producers' sales are to be made should be carefully considered and examined in the light of the CATCO decision, and in determining that the producer sales herein proposed should be neither denied nor conditioned we have considered every element required or indicated by the Court.

"As we understand the CATCO decision, the Supreme Court held, in essence, that the producer's proposed initial price must be supported by substantial evidence establishing that the price is required by the public convenience and necessity and is in the public interest; that although the commission should consider all the factors and has broad discretion in determining whether an initial price is so supported, price is an element of prime importance and the commission should scrutinize the price closely with a view to protecting the consumer and holding the line against price rises. The Court further held that the commission can attach such price conditions as it believes necessary when the proposed price is out of line, when it might result in a triggering of general price rises by reason of favored-nation clauses, or when its approval might result in a general increase in applicant's existing rates.

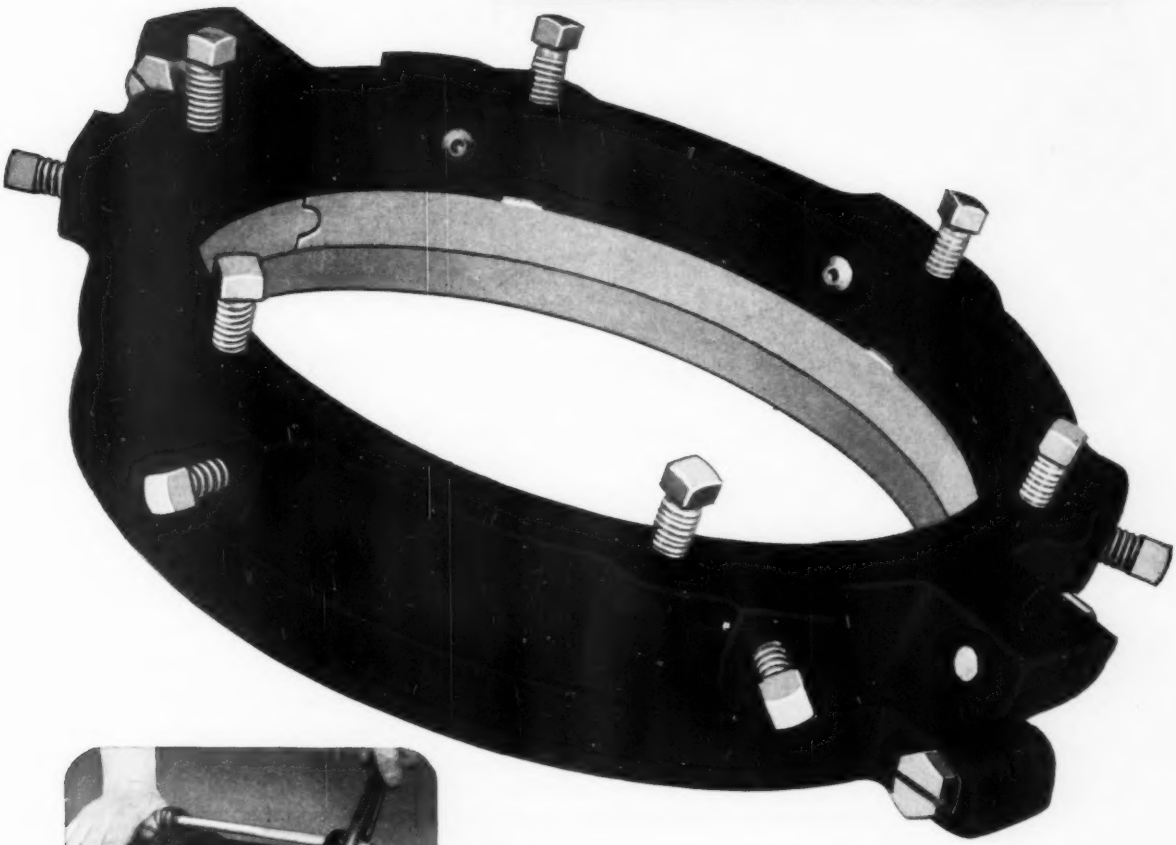
"The Court did not attempt to prescribe rigidly the quantum of evidence which must be adduced in every case, but indicated what kind of evidence was insufficient; what kind of evidence might or should have appropriately been adduced in consideration of the record there; and thereby, what kind of evidence might or should be adduced in other cases, depending on the factual circumstances present in such cases. Thus, the Court held that evidence of the contract, with little more, is not sufficient to support the issuance of a producer certificate. Evidence which the Court indicated would have probative value in a given case, even though the necessity for such evidence might depend on the facts of the particular case, includes evidence of comparisons with the weighted average cost of gas to the purchaser; evidence of whether the proposed producer price would lead to an increase in the rates of the purchaser, and evidence in the record of a public need for the gas. In addition, it appears from the Court's opinion that producer certificate proceedings need not assume the character of rate proceedings under Sections 4 or 5 of the Act."

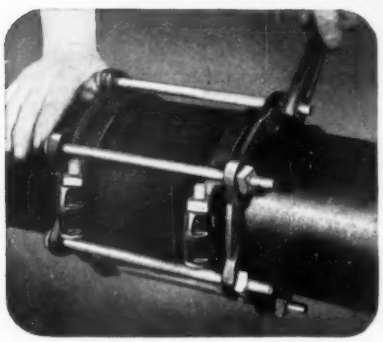
The New York Public Service Commission vigorously urged that the effect of the CATCO decision is to require FPC to condition any producer application for a sale in southern Louisiana in which the price exceeds 18 cents including tax, which price it calls the "pre-Catco" level of price. FPC stated that the CATCO case held that "we should consider in each case all of the elements of public convenience and necessity, giving particularly careful attention to the element of price, and in the exercise of our sound discretion, decide whether the public interest requires a certificate to issue at the proposed price in such case. We do not read into the opinion any such interpretation as is suggested."

FPC also disagreed with the statement that 18 cents was the "pre-Catco" level of prices in southern Louisiana. True, the majority of the sales in that area were made at prices at or below 18 cents, but there were many sales at higher prices. In early 1953 before FPC took jurisdiction over producer

Continued on page 142

FOR THREAD LEAKS AT FITTINGS





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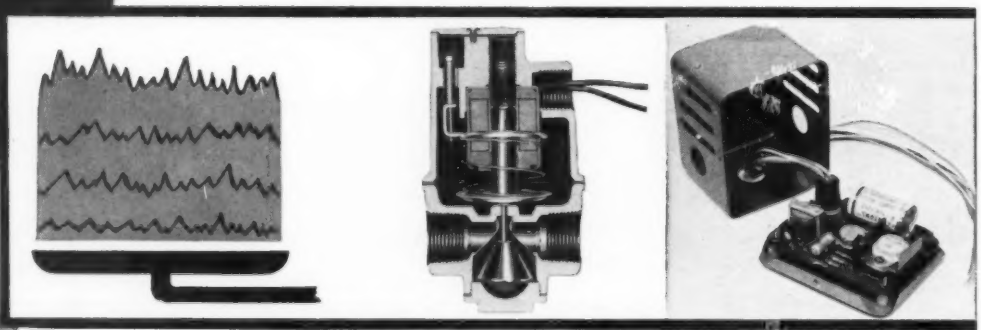

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TECHNICAL TRENDS

By GUY CORFIELD

Magnifying time and dividing motion

One need only to look through a few technical magazines—principally on the advertising pages—to realize the amazing tools that are being developed for research. It seems that if information is wanted, and we are willing to pay for it, someone has probably developed or can develop an instrument to provide the answer.

In high speed motion photography, for instance, it is possible to photograph an event occurring in one second and view it in motion for 22 minutes. A precision camera of the intermittent stop-go film movement type can take 400 frames per second as compared to the conventional 16 per second. With a continuously moving film and rotating prism, 8000 frames per second can be taken. By doubling the number of prism faces and halving the height of the frame, 16,000 frames per second can be obtained. A camera using a rotating film can take 90 frames at the rate of 100,000 per second. Another with stationary film and a rotating mirror can achieve 25 frames at the rate of 4.3 million per second. Some of these cameras of course are highly specialized and built for a specific purpose. However, many are commercially available. For instance, Beckman & Whitley Inc., San Carlos, Calif., advertises a Magnifax which "extends time scale by a factor of 1 to 200," and Dynafax which takes 25,600 exposures per second. Both black and white, and color, can be reproduced in many applications. Quantitative data can be obtained by including in the pictures objects that will indicate time and distance (such as timing mechanisms and rulers).

Edgerton, Germeshausen & Grier Inc. of Boston and Las Vegas advertise that it has "designed, developed, produced and operated systems, instruments and components that control and record phenomena in the sub-millimicrosecond range—*in the time it takes light to travel less than two inches!*"

But perhaps the most fantastic is the Hughes Aircraft "Clock" that is being developed to orbit in an earth satellite to check Einstein's Theory of Relativity—that time is different at different speeds of movement. The clock operates by counting the vibrations of ammonia molecules. It will be accurate to one second in 1000 years. One will be placed in orbit and another operated on earth. Under the conditions as visualized and if the theory is sustained as understood, the satellite clock will deviate from the one on earth by one second in about 60 years.

More on the Discomfort Index

The Discomfort Index is a rather recently developed criterion to express the condition of human discomfort (or comfort) resulting from a combination of temperature *and* humidity. The concept is of course not new. We have all used and appreciated the expression "It's not the heat, but the humidity," and air conditioning engineers have for many years designed on the basis of "Effective Temperatures."

The Discomfort Index developed by the U. S. Weather Bureau, however, is advocated for general public understanding and information as well as for engineering use. It is derived from a simple formula using the air temperature (dry bulb, DB) and either the per cent relative humidity (RH) or the wet bulb temperature. This formula is given, with other data, in an item in Technical Trends of November 1958 titled "Cooling Degree Days—The Discomfort Index."

In practical application, it appears that a few people begin to feel uncomfortable when the Discomfort Index reaches 70; about half of them will notice "the heat" at an Index of 75; and all will feel definite discomfort at 79. A complete tabulation of the Index values, from 70 to 120 deg DB, and 10 to 90 RH, has been published in the June, July and August issues of Air Conditioning, Heating and Ventilating. The following figures will show how various combinations of DB and RH produce the same Index:

Discomfort Index	Dry Bulb Temp.	% Rel. Humidity
)	76	90
)	79	65
75)	83	42
)	86	28
)	90	15

As suggested in the previous Technical Trends item, Discomfort does not seem to be the most fortunate expression, particularly to anyone trying to sell air conditioning. *Comfort* Index would be consistent with the concept that the Index is a measure of the combination of cooling and dehumidification required for comfort. The Weather Bureau is considering a change to Temperature-Humidity Index, and the figures are now appearing under this caption in the weather reports and forecasts in several areas.

Other suggested names are:

Heat-Moisture Index.
Cooling Degree Index.
Humitemp.
Thermidity.
Air Conditioning Value.
Effective Heat Index.
Human Reaction Scale.
Toler-Rate.

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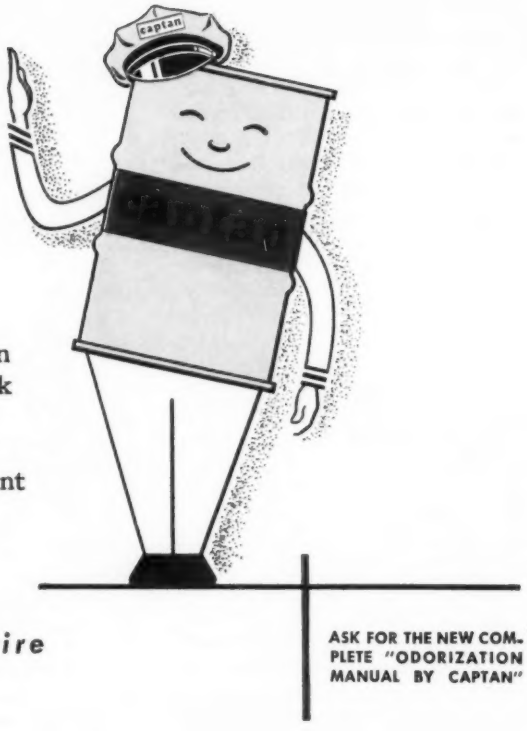

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WASHINGTON

By NEIL REGEIMBAL
GAS Washington Bureau

Canadian board may go for gas export

MIDWESTERN Gas Transmission Co., fighting to import Canadian gas before both U. S. and Canadian governments, may have received a bonus first-down from the Maple Leafers.

Makeup of the new Canadian National Energy Board will apparently tend to help the company in its plan to bring 204 MMcfd into this country from Canada. The board is composed of five gas, fuel, and energy experts, although it can not yet at least be called pro-export.

Chairman of the new board is Ian N. McKinnon, who will serve for two years on leave from his post as chairman of Alberta's Oil and Gas Conservation Board. As chairman of the board, he gave the province's approval for three key export applications involving Westcoast Transmission Co., Trans-Canada Pipe Lines (Midwestern), and Alberta & Southern Gas Co. Because both provincial and national Canadian governments must approve export applications, he will go over these same three applications.

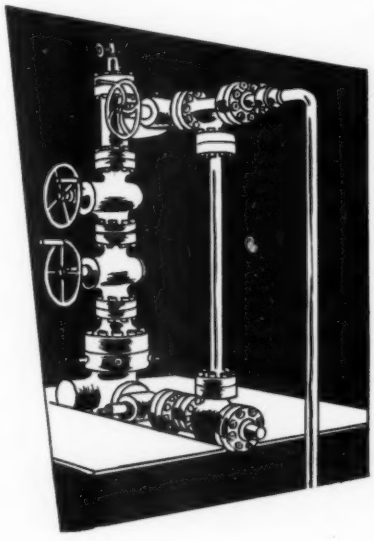
McKinnon has been a civil servant in Alberta for some 30 years. He has been chairman of the province's oil and gas agency since its inception in 1948.

Another member, Dr. Robert D. Howland, an economist from Nova Scotia, served on the Royal (Borden) Commission on Energy which recommended that the National Energy Board be created. He has also in the past been connected with Canada's coal industry in various capacities.

Douglas M. Fraser, also an economist, was formerly a manager of Trans-Canada Pipe Lines. As director of the Ottawa commerce agency, he helped prepare the legislation creating the energy board. He has also in the past been an advisor to a government coal commission.

The other two members are H. Lee Briggs, an electric engineer and electric power expert, and Jules A. Archambault, a transportation and public transit expert.

The National Energy Board is charged with much the same tasks as the U. S. Federal Power Commission has acquired through legislation and court orders. But for the time being it has fairly broad powers to set its own methods and in some cases amounts of control it will exercise over the gas, oil, and electric industries.



In the case of exports, the board is charged simply with balancing the need for export markets against the potential needs of the Canadian economy in view of present and expected supplies. It is required to make certain that Canadian consumers aren't subsidizing cheap gas for the U. S. In addition, the board is to see that promotors don't reap huge windfall profits, and that preference is given to Canadian firms when and if possible.

It is not yet required to control pipeline tolls, although it may, as long as Canadian business and consumers get a fair shake.

Midwestern wants to tap the Trans-Canada Pipeline at Emerson, Manitoba, and bring the gas for resale and distribution in a wide area of the northern mid-section of the U. S. This application, coupled with the other two large pending gas export applications, account for some 770 MMcf and about a half-billion dollars in capital investments.

While most of the Canadian natural gas now available for possible export is produced in Alberta, new gas producing regions are opening up in other sections of the Dominion. For instance, Canadian officials reported in August that the first discovery of oil and gas has been made in the Yukon. This is the first far North discovery since 1920.

Continued on page 140

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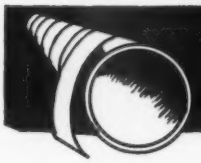


CORROSION PREVENTION

By MARSHALL E. PARKER

Pipe-to-soil potential—2

WE can measure what we call pipe-to-soil potential with a voltmeter, a potentiometer, a potentiometer-voltmeter, or a vacuum-tube voltmeter. We connect the positive terminal of the instrument to the copper/copper sulfate electrode, and the negative terminal to the pipe. If we use a voltmeter, we must take care that the circuit resistance (leads, contacts, and electrode) is small compared to that of the meter; the error is of the same magnitude as the ratio between the two. For example, if the loop resistance of leads-electrode-soil contact-pipe is 250 ohms, measured at the instrument terminals, and we are using an instrument whose resistance is 50,000 ohms, then the error will be 250/50,000=.005, or .5 per cent. If, however, the loop resistance is 5000 ohms, the same instrument will yield an error of 10 per cent.

Since we do not normally know what the loop resistance is, it is necessary to have a way to determine whether or not the error is acceptable. This can readily be done with a voltmeter which has more than one range. The reading is taken on the appropriate range, and then repeated on the next higher. Since the resistance of the meter is higher on the higher range, the error should be smaller in the same proportion. So, if we get essentially the same reading on the two ranges, we can safely assume that the error is small. If there is an appreciable difference between the two readings, the corrected value can be calculated from

$$V_C = \frac{V_L V_H (R - 1)}{R V_L - V_H},$$

where V_C=the corrected reading, V_L=reading on low scale, V_H=reading on high scale, and R=ratio between the scales. If, as is frequently the case, the ratio between the two scales is 2:1, the expression reduces to

$$V_C = \frac{V_L V_H}{2 V_L - V_H}.$$

There is available a specialized voltmeter for this purpose, which obtains the correction by a similar principle, but is easier to use. Without changing scales, it is possible to change the sensitivity, or resistance, of this voltmeter, by a ratio of 2:1 by merely pushing a button. With the button in the normal position, it is a 50,000 ohms per volt meter. With the button depressed, it is a 25,000 ohms per volt meter. And, with this ratio, the correction is very simple—even simpler than the formula given above, for small corrections. The difference between the "high" and "low" readings is the same as the difference between "high" and "corrected." For example, if the reading is 892 millivolts with the button up and 888 millivolts with it depressed, then the correct value is 896 millivolts. This can be used up to an error of about 10 per cent; if the difference in the two readings exceeds that value, then the more precise correction formula given above must be used.

If we use a potentiometer or a potentiometer-voltmeter, we are not greatly concerned with the resistance of the circuit. Theoretically, this resistance does not affect the reading obtained; actually, it affects the *sensitivity* of the instrument. If the resistance is very high, then the balance will be sluggish, and there will be a wide area of uncertainty. In dry, sandy soil, for example, a potentiometer may indicate a balance somewhere between 300 and 700 millivolts; after water is added to the contact area, the balance may be indicated as between 505 and 510 millivolts, or perhaps even closer. A major advantage of the potentiometer or potentiometer-voltmeter, as compared with the ordinary voltmeter, is that there is never any doubt as to whether we have a high-resistance circuit; it is immediately obvious, from the lack of sensitivity.

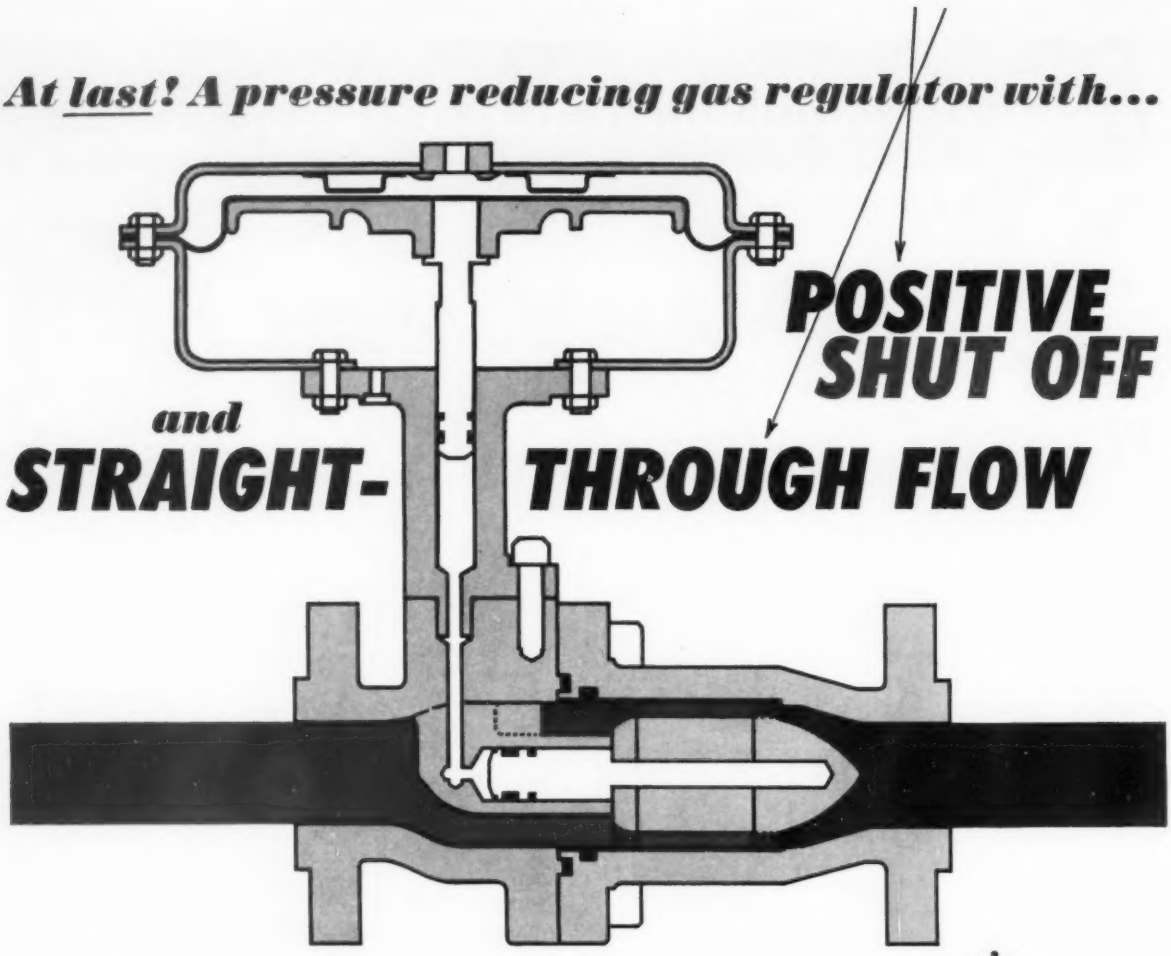
The vacuum-tube voltmeter behaves, with respect to the external circuit, like a high-resistance voltmeter. Its effective input resistance is usually much higher than can be had in an ordinary voltmeter; instruments available range from one megohm (one million ohms) per volt to 100 megohms, whereas the conventional voltmeter rarely exceeds 100,000 ohms per volt. In operation, this instrument is slightly more complicated than a voltmeter, which has only to be connected to the circuit.

The vacuum-tube voltmeter has to be warmed up, which requires from 5 seconds to 1 minute in different models. It has also to be zeroed or calibrated, which requires but a few seconds. Most instruments are subject to some drift, so that the zero has to be re-checked before each reading for maximum accuracy. Batteries must be checked, and replaced at proper intervals. Most vacuum-tube voltmeters are subject, partly as a consequence of their extreme sensitivity, to erratic readings due to electrostatic charges, especially in dry weather.

Circuit resistance is important to all techniques of measuring pipe-to-soil potential, more so to some than to others. Of all the elements of this resistance, the largest is

Continued on page 140

At last! A pressure reducing gas regulator with...



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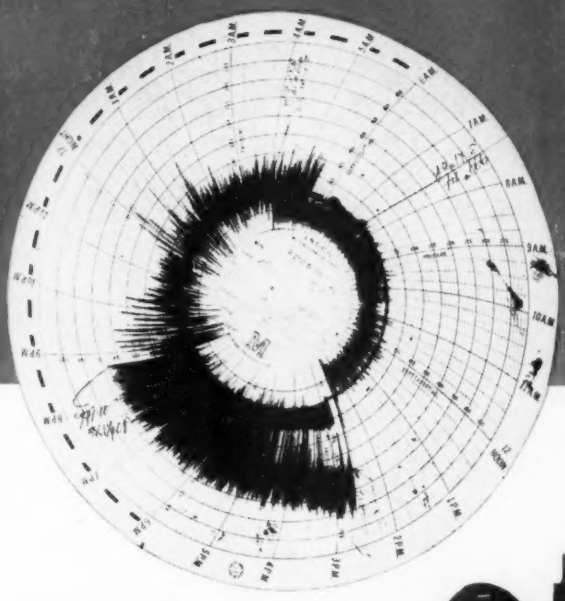
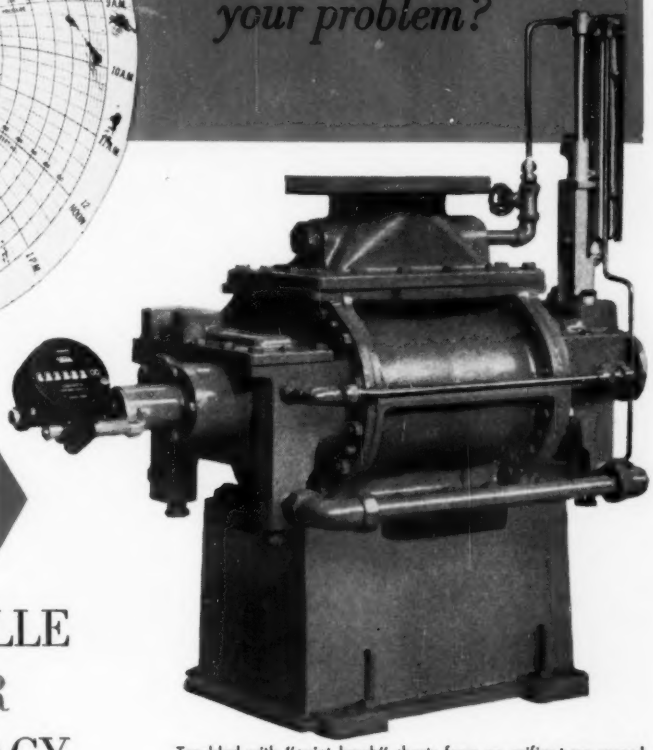


Are "paint brush" charts like this your problem?

Here is your easy-to-read solution.



Troubled with "paint brush" charts from an orifice-type recording meter used for testing wells, Shell installed the R-C Rotary Meter and now obtains clear and accurate data recorded on a punched tape along with other well test information.

ROOTS-CONNERSVILLE ROTARY GAS METER MAINTAINS ACCURACY AND READABILITY, EVEN WHEN FLOW RATES FLUCTUATE RAPIDLY

At Shell Oil offshore installations in the Gulf of Mexico, the oil and gas output of 16 or more wells passes through a single gathering platform before being piped to gas transmission lines, storage tanks and refineries. The gas flow from each well must be measured at intervals so that oil-gas ratios can be determined. Pressure in the well to be measured is reduced to 40 psig for metering, the oil separated, and the gas piped into a 4 x 8 high-pressure R-C rotary positive displacement meter. After a selected period of testing, this well is returned to normal operation and the next well switched in to test. The operation is continuous and automatic on whatever time cycle is chosen. The orifice meters previously used for measuring gas flow recorded the fluctuation in flow in such a way that instrument charts were difficult to integrate. Maintenance requirements were high and frequent chart readings necessary.

The R-C rotary meter accurately measures the fluctuating flows from each well and this accuracy is unaffected by continuous fluctuation. Well pressures range from 50 to 2000 psig. Direct readings, corrected to standard conditions can be taken from the meter or transmitted remotely. No stand-by personnel is needed to service the meter or read charts. Repetitive flow readings can be obtained to determine accurate oil-gas ratios.

R-C rotary positive displacement meters were selected as a result of field tests, which proved them most accurate in measuring the wide range and rapid fluctuations in flow rates.

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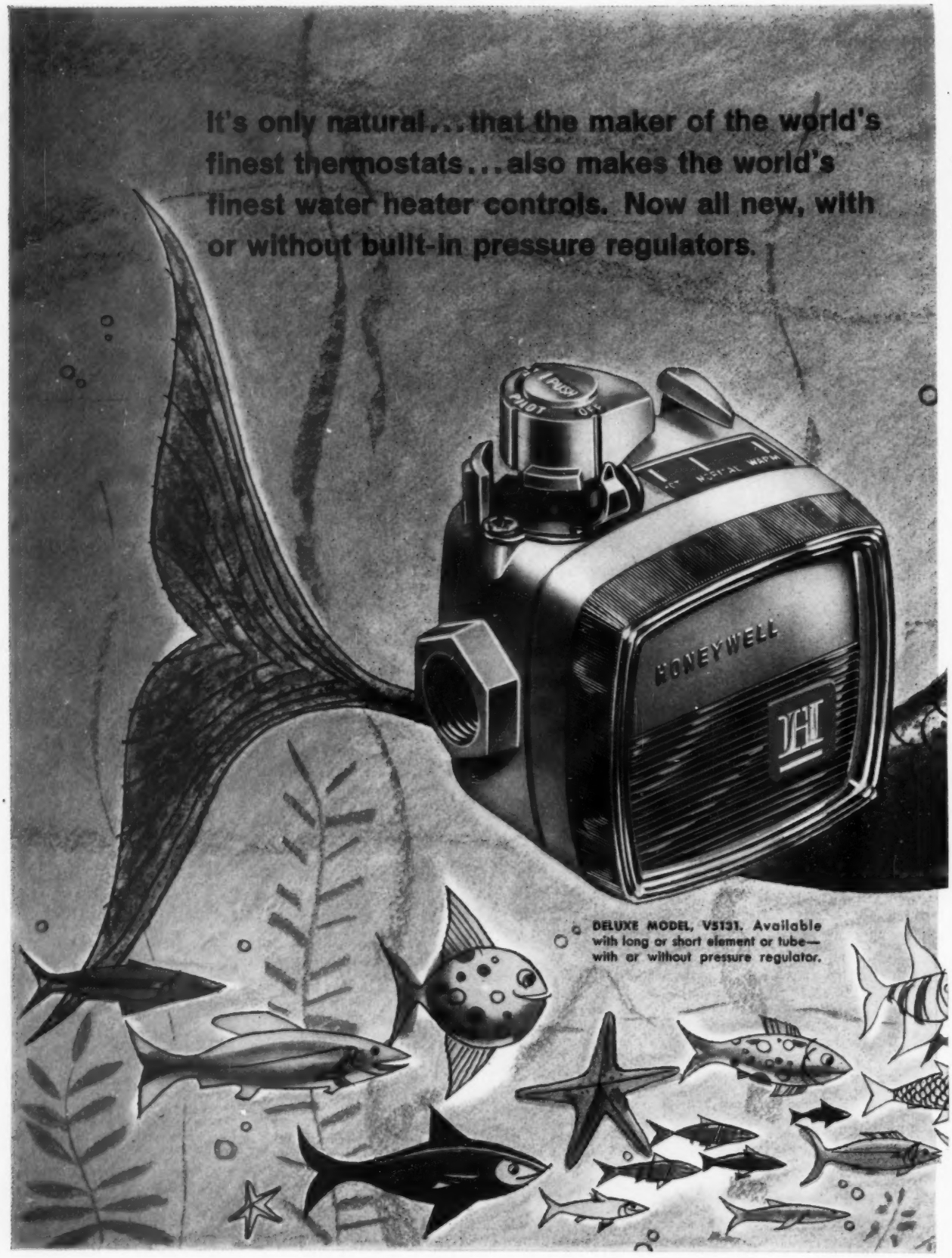
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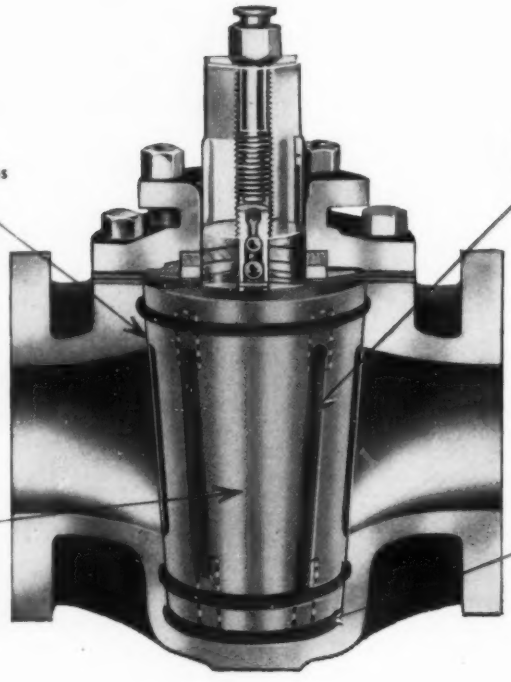
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WEAR IS STOPPED by tough film of lubricant on all vital surfaces.
CAN'T GALL because lubricant hydraulically "jacks" plug keeping it free for instant operation.

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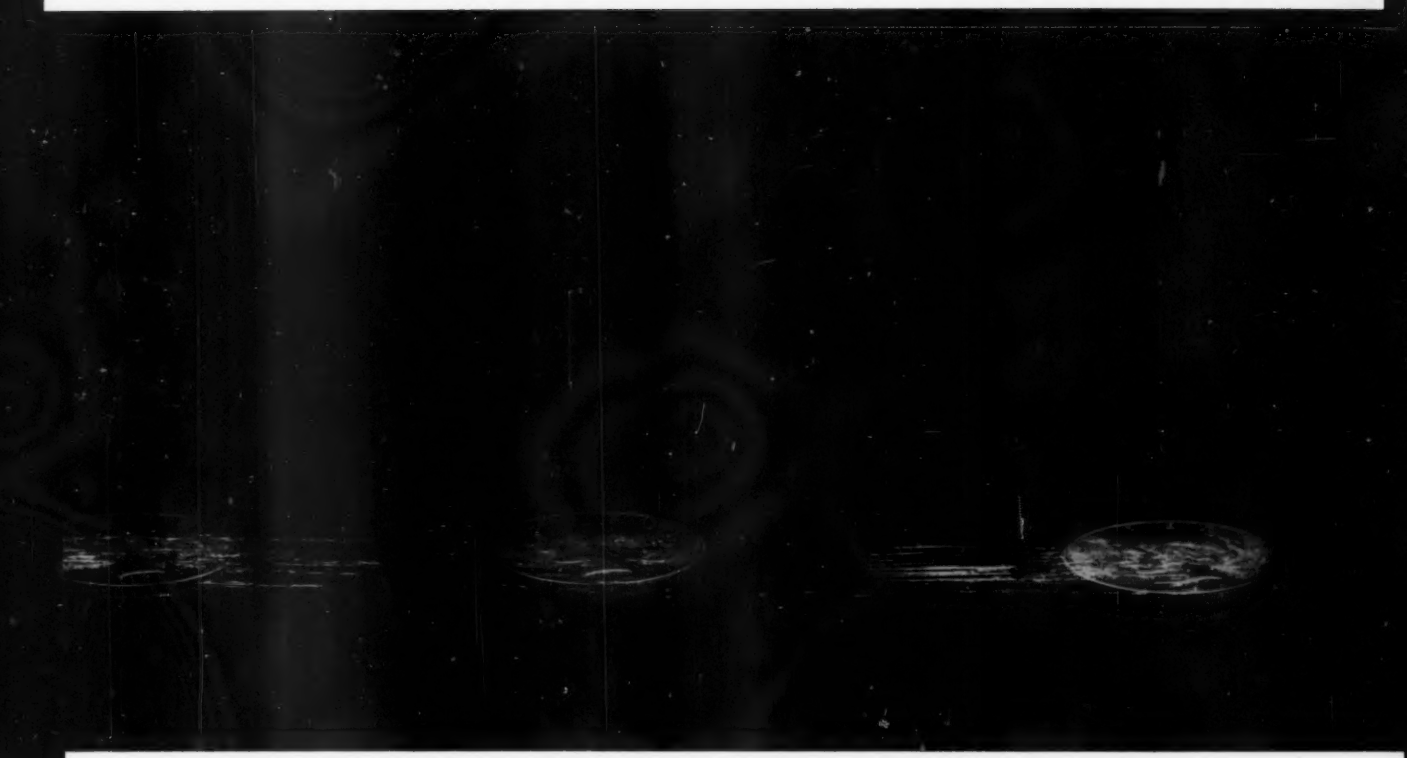

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LUBRICONOMY

"Lubriconomy" is a streamlined way of saying that valve lubrication *is* economy . . . it saves money by eliminating wear.

Lubrication in Rockwell-Nordstrom valves will make your valve dollars go farther because it eliminates the wear of metal-to-metal friction on *every* moving part. Comparing these valves to other types is simply comparing a lubricated to a non-lubricated mechanism . . . which would you expect to work better, longer and at lower cost?

But lubrication in Rockwell-Nordstrom valves does more than eliminate wear—it assures extraordinary leak-proof control and dependability. *Pressurized* lubricant in the exclusive Sealdport® system creates a powerful double seal against leakage. (Much like a puncture-proof tire, pressurized lubricant sealing "heals itself" if cut, scratched or worn). And lubricant also hydraulically cushions the plug to keep it free for *instant*, quarter-turn operation.

More than 6 *million* Rockwell-Nordstrom valves are saving money today on every imaginable type of service. Why don't you try just *one* where you've had valve problems? Write for details, or have a Rockwell field engineer visit you. Rockwell Manufacturing Company, Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

difference

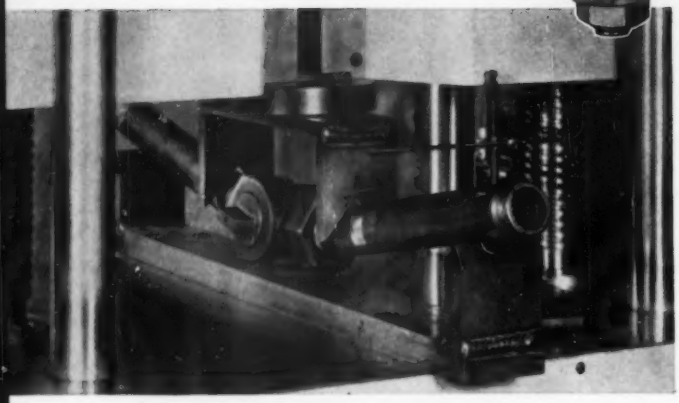
ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL

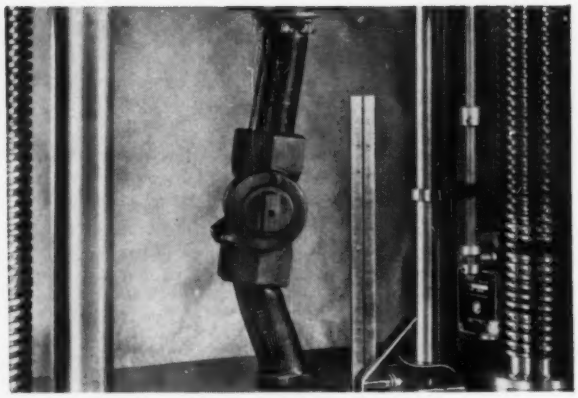
Special Report from MUELLER CO.

Rugged tests prove durability of new MUELLER® *500 pound LubOseal Stop made of Ductile Iron*



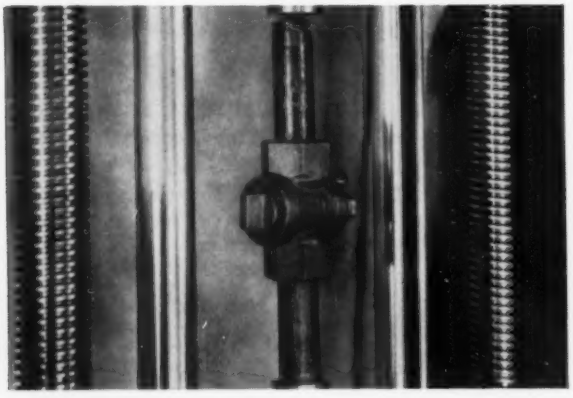
1. BENDING TEST

Schedule 80 Steel Pipe. Bending load of 4,000 pounds applied. Bending moment — 18,000 inch pounds.
Results: Pipe badly distorted. Stop position bent 2.83 inches out of line. Stop intact. Retested at 500 p.s.i. air pressure under water in closed position. *No leaks at top or bottom of key or through port.*



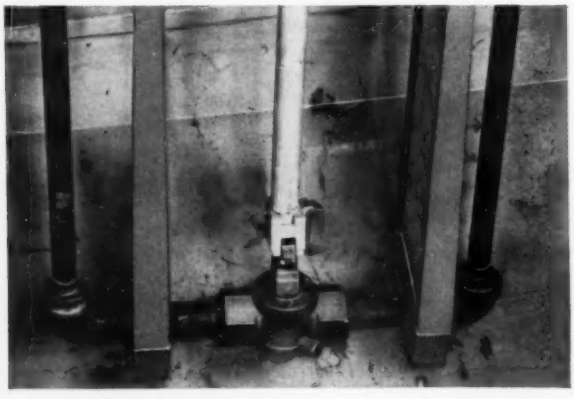
2. COMPRESSION TEST

Schedule 40 Steel Pipe. Compression load of 26,200 pounds applied.
Results: Pipe badly distorted. Pipe threads stripped. Stop position bent 1.30 inches out of line. Stop retested to 500 p.s.i. air pressure under water. *Absolutely tight in closed position with no leaks at top or bottom of key.*



5. TENSILE TEST

Schedule 40 Steel Pipe. Tensile pull of 22,150 pounds applied.
Results: Pipe stretched to breaking point in threaded section. Stop retested with 500 p.s.i. air pressure under water. *Absolutely tight in closed position with no leaks at top or bottom of key.*



6. CYCLING TEST

Stop fully opened and fully closed for 6,500 cycles while submerged in water and under air pressure of 350 p.s.i.
Results: Stop did not leak during operation. Stop regreased and retested with 500 p.s.i. air pressure under water. *No leaks at top or bottom of key or through port with stop closed.*

To meet the need for a high pressure meter stop, Mueller Co. has developed a new LubOseal Stop with body and key cast from ductile iron. Ductile iron was selected because of the need for a stop with higher impact and fatigue resistance and the strength of steel.

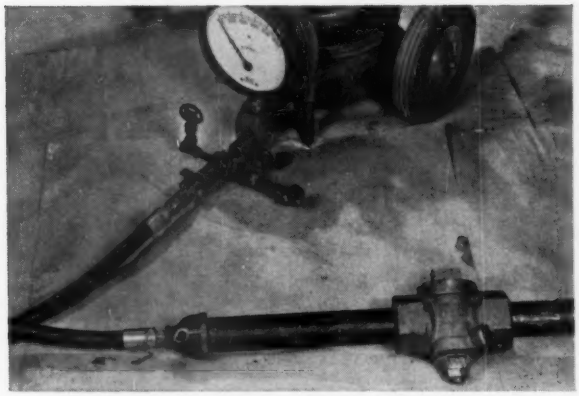
Mueller Engineers have subjected this new stop to the severest of tests in Mueller's Product Testing and Development Laboratory. Several of these tests are shown here.

System piping stresses were simulated by exhaustive compression, tension, torsion and bending tests. Cycling tests were used to determine the service life of the stop. Relubrication tests determined the functionality and durability of the greasing system.

Pressures, far in excess of those encountered in a high pressure system, were imposed on the stop to verify the degree of safety incorporated in the stop design.

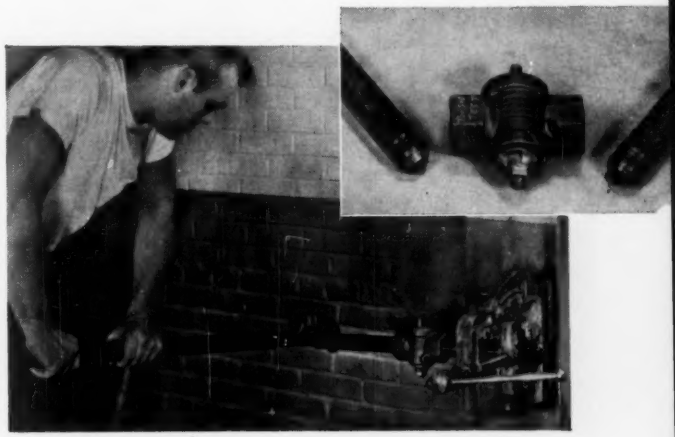
The results of this extensive test program have proven the ability of the new Mueller 500 pound, Ductile Iron LubOseal Meter Stop to perform successfully under even the most adverse operating conditions at its rated pressure of 500 p.s.i.

If you would like full information and specifications on these new stops, write today to: Mueller Co., 512 West Cerro Gordo Street, Decatur, Illinois.



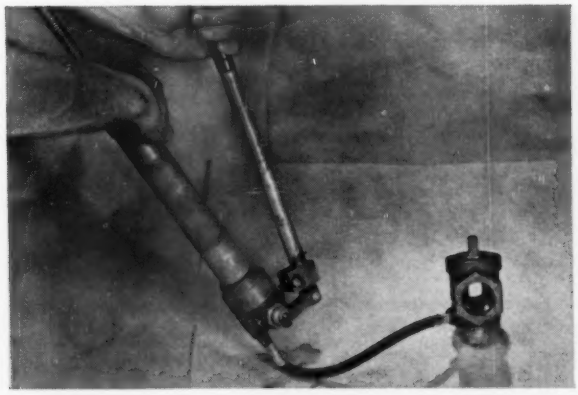
3. HIGH PRESSURE DESTRUCTION TEST

Stop in closed piping system. Extreme pressure applied.
Results: Reducing coupling broke at 9,500 p.s.i. Stop did not leak. Stop retested with 500 p.s.i. air pressure under water in closed position. *No leaks at top or bottom of key and negligible port leakage. Stop shows high safety factor.*



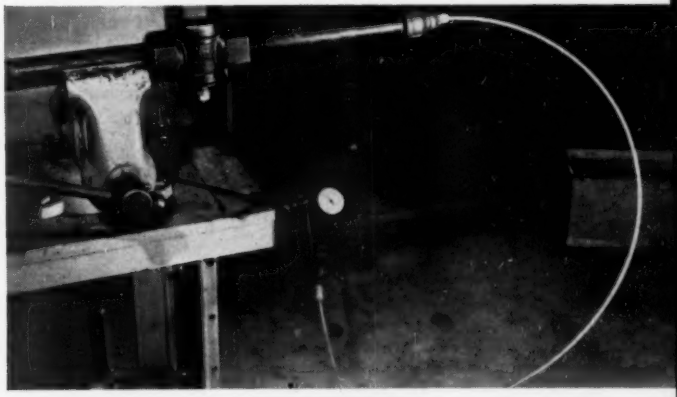
4. TORSION TEST

Schedule 40 Steel Pipe. Pipe securely fastened in pipe vise. Torque applied to pipe on opposite side of stop.
Results: Extensive tightening caused pipe to fail with no damage to stop. Stop retested with 500 p.s.i. air pressure under water. *Absolutely tight in closed position with no leaks at top or bottom of key.*



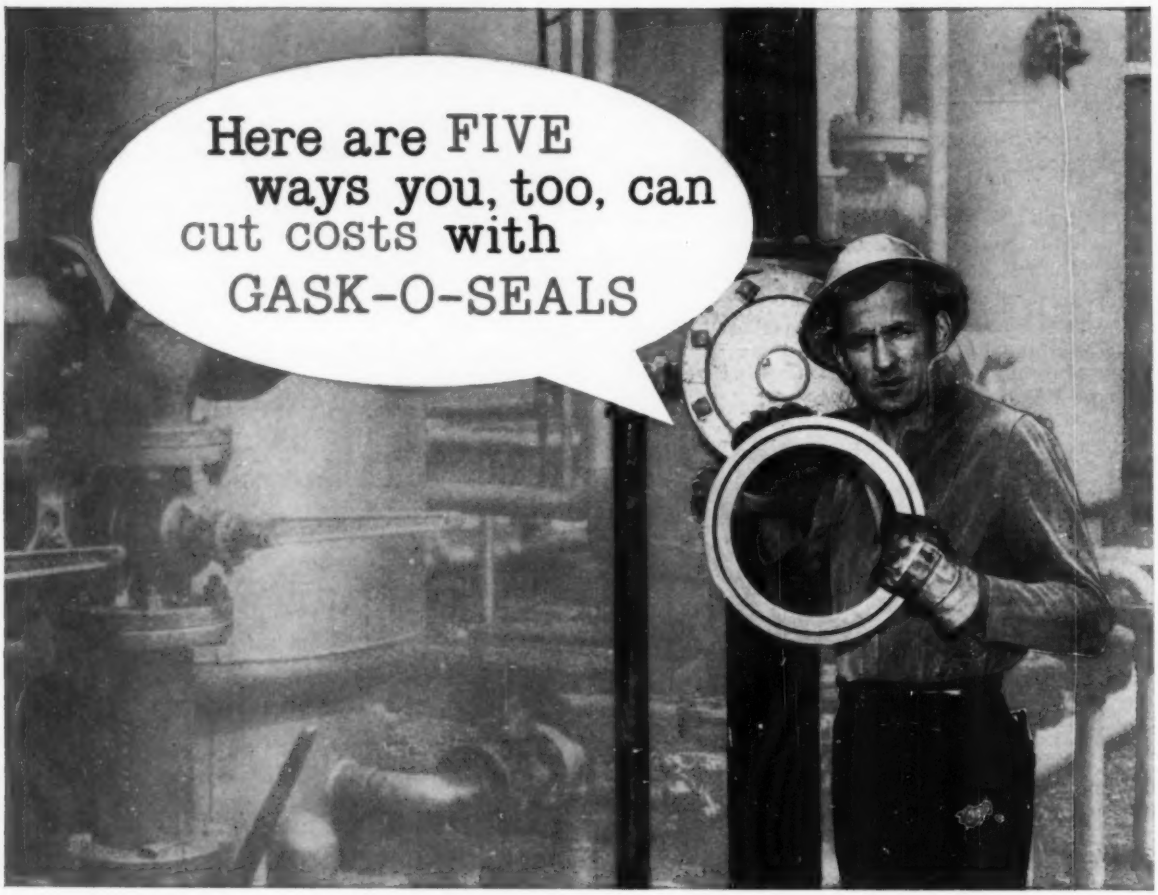
7. REGREASING STOP IN OPEN POSITION

Excessive grease pressure applied.
Results: *No grease entered port.*



8. REGREASING STOP IN LINE

Grease plug removed and stop regreased at rated line pressure of 500 p.s.i.
Results: *No loss of grease through relubrication port due to high line pressure.*



1

No scraping, cleaning, resurfacing or replacing flanges when installing new seal!—

The unique design of Gask-O-Seals will save hundreds of man hours, and eliminate the tedious work of reconditioning flanges.

2

Save downtime—

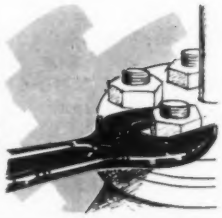
Gask-O-Seals will not wear due to **pulse** or **vibration.** They last longer and are quickly and easily changed. **Sure, positive** sealing extends seal life. Fool proof installation reduces replacement time and repair.

3

Eliminate extreme hazard of "blow-out"—

Since Gask-O-Seals are **totally** confined with metal-to-metal contact of faying surfaces, the danger of a seal "blowing out" is completely eliminated under normal working conditions. This feature alone can save your company millions of dollars.

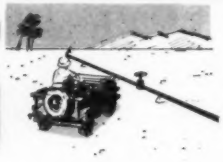
4



No retorquing of bolts necessary—

Once a Gask-O-Seal is installed there is no need to re-torque bolts. The seal can not "creep" or "cold flow." There is no need for tightening bolts to maximum, causing distortion of flanges. . . . . the flanges are easy to break loose at time of repair or overhaul.

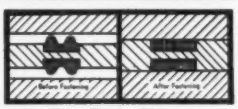
5



Re-useable—

Due to the carefully controlled mass-to-void ratio in the Gask-O-Seal design, the seal can not be over squeezed — its "memory" never destroyed by fastening pressures. They, therefore, may be reused several times with just ordinary care.

Plus — Due to low fastening torques required to effect a seal, flanges can be designed to greatly reduce mass and smaller bolts used, less bulky wrenches and tools are required and automatic equipment used for even faster installation. Gask-O-Seals will seal water, oil, air, hydraulic fluids, gases, gasoline and many other fluids; hi-vacuum to hi-pressure, in a very wide temperature range.



Try Gask-O-Seals and reduce your maintenance costs **now.**

Parker SEAL COMPANY

CULVER CITY, CALIFORNIA and CLEVELAND, OHIO

A DIVISION OF PARKER-HANNIFIN CORPORATION

HANDLEY-BROWN *Curb Boxes*

7 WAYS BETTER

1 EASY-TO-LOCATE. *You save time and money* because the built-in magnet and aluminum plate in H-B curb boxes make them easy to find with either magnetic or electronic finders.

2 STRESS-FREE. H-B curb boxes *save you money*. They telescope easily, prevent damage to service stops and piping.

3 LIGHT IN WEIGHT. 7 times lighter than cast iron, H-B curb boxes *save you money* because they are easier to handle. Cut installation time.

4 NON-CORRODING. H-B curb boxes are constructed of a resin-rubber compound*. *You save money* because this material is trouble-free. *It's the same as used in oil field and chemical plant pipelines.*

5 PERMANENT. *You save money* on replacement, because H-B curb boxes are completely permanent . . . remain unharmed by either moisture or soil acids.

6 CUT STORAGE AND HANDLING COSTS. H-B curb boxes *save you money* because they are packed five to a container. They're not only easier and *safer* to handle, but easier to store and stack.

7 FULLY ASSEMBLED. Unpack a container of five H-B curb boxes and *you save money* because they are fully assembled . . . ready for installation.

IT WILL PAY YOU to specify Handley Brown Curb Boxes. Leading gas utilities all over the Country (names on request), are making the switch to H-B after rigorous on-site tests. A representative will be glad to show you the advantages. Write today for information.

End call backs with attractive H-B outside meter boxes. Available as shown, or for recessed installation. Made of tough resin-rubber compound*.

Master Poly-Trol *automatic* gas shut-off valve. Shuts-off gas in event of overpressure, underpressure, excessive high temperature, and flooding. Serves also as a tamper-proof manual shut-off.

Service Test Station. Provides a test station for leak surveys. Permanently installed. Makes random probing unnecessary. Made of tough resin-rubber compound*. Main test station also available.

H-B Cathodic Terminal Box. Landscape engineered, and non-corroding*. Leads are attached to the terminal block in the cap for easy testing.

Roadway Valve Boxes . . . designed to reduce the danger of vehicles damaging valves and gas mains. Constructed of a resin-rubber compound*, they telescope freely. Never rust. Never rot. Weight: only 9 lbs. each.

*A. B. S. Polymer

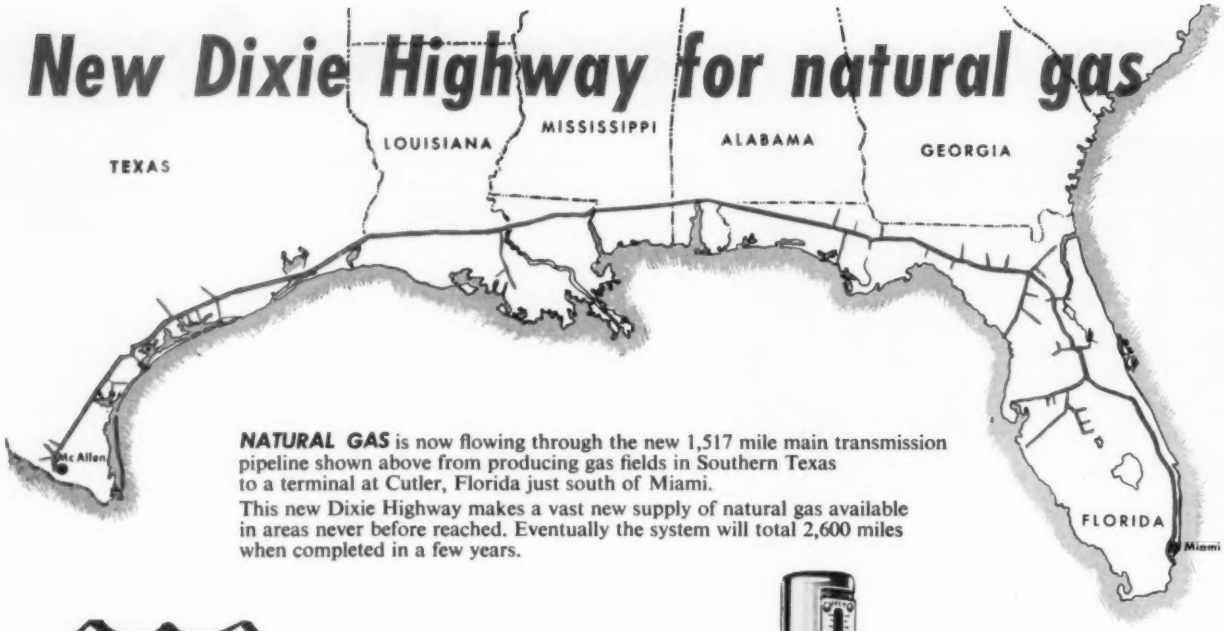
+Patents applied for

HANDLEY-BROWN CO.

2102 BROOKLYN ROAD • JACKSON, MICHIGAN

"H-B engineering makes the big difference"

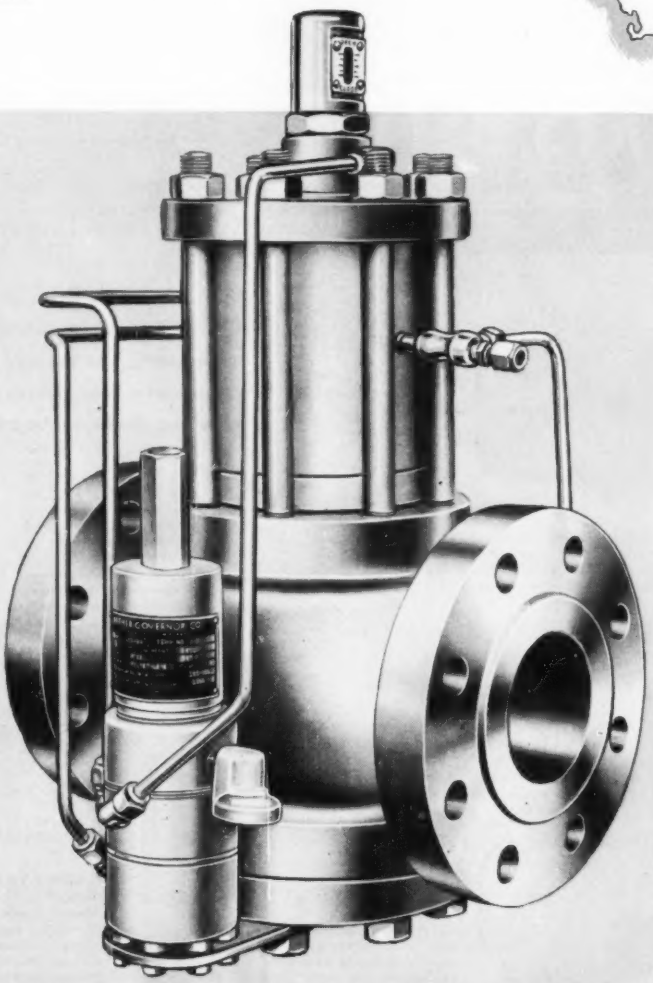
New Dixie Highway for natural gas



NATURAL GAS is now flowing through the new 1,517 mile main transmission pipeline shown above from producing gas fields in Southern Texas to a terminal at Cutler, Florida just south of Miami.

This new Dixie Highway makes a vast new supply of natural gas available in areas never before reached. Eventually the system will total 2,600 miles when completed in a few years.

FISHER
Type
403-94



New Fisher high pressure regulator has unusual rangeability of 7000 to 1 in handling flows under varying inlet conditions. Shuts off dead tight at 1000 psig pressure drop with little buildup in downstream pressure. Holds a steady, even pressure with exceptional accuracy. Small, compact . . . can be easily assembled or disassembled by one man. Takes full upstream high pressure on downstream side without stress or strain on any part. Available in 1″, 2″, 4″, and 6″ sizes.

IF IT FLOWS THROUGH PIPE ANYWHERE IN THE WORLD . . . CHANCES ARE IT'S CONTROLLED BY . . .

with traffic regulated by

Fisher Controls

The last frontier in the United States has been conquered by natural gas. Houston Texas Oil and Gas Corporation has put into operation a system that stretches across half the nation. They chose the most effective, safest, economical pressure controlling equipment to perform the regulating duties along this natural gas superhighway. While Fisher Governor Company supplied several hundred dependable controls, their main contribution was the development of a new high pressure regulator and a house service regulator especially for this Texas to Florida pipeline.

We've given just a few of the pertinent facts about these two new Fisher controls. For complete data write Fisher Governor Company.

FISHER Type S252-4

This new service regulator handles 99% of all domestic installations. Small and compact. Rated at 250 CFH at 2 psi inlet set at 7″ W.C. outlet. Will easily pass 400 CFH or more at higher inlet pressure. Internal boosting feature enables regulator to maintain straight line control. Used by a majority of the distribution companies in Florida. Internal relief provides full protection against over-pressure in accordance with ASA B31.1 Code. Sizes ¾″ or 1″ also available with integral meter bar.

FISHER® Controls

SINCE 1880

FISHER GOVERNOR COMPANY

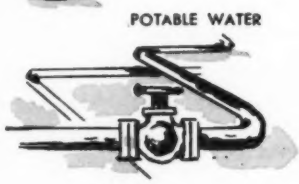
Marshalltown, Iowa / Woodstock, Ontario / London, England

BUTTERFLY VALVE DIVISION: CONTINENTAL EQUIPMENT CO., CORAOPOLIS, PENNSYLVANIA

REMARKABLE *new* RIGID PLASTIC PIPE!

★ **Higher Tensile Strength**

★ **Higher Heat Resistance**



MADE OF

CYCOLAC® C ABS

ABS TYPE II
Thermoplastic Resin
(NSF APPROVED)

New Thermoplastic Resin from BORG-WARNER

Now there are two types of ABS rigid plastic pipe made of Cycolac, the *tough* thermoplastic. The original Borg-Warner Cycolac L ABS Type I resin has already proved its worth in scores of applications from coast to coast.

The new Cycolac C ABS Type II resin offers increased tensile strength, greater heat resistance and other important advantages over metal. Among these are light weight, ease of installation and protection against corrosion.

To users of pipe, Cycolac C offers superior service over a greater range of temperatures with increased chemical resistance.

WRITE FOR NAME OF YOUR NEAREST CYCOLAC EXTRUDER

PACESETTER IN
Marbon CHEMICAL
SYNTHETIC RESINS

DIVISION of BORG-WARNER
WASHINGTON, W. VA. • GARY, INDIANA
also represented by:
WEST COAST: Harwick Standard Chemical Co., Los Angeles, Cal.
CANADA: Dillons Chemical Co. Ltd., Montreal & Toronto
EXPORT: British Anchor Chemical Corp., New York

BW® Marbon

MUELLER®

Products and people, dependably serving every water and gas distribution system — for over a century!

Supplying a constant flow of water and gas to your home or your industry requires highly specialized tools and equipment.

For example, this Mueller automatic drilling machine is used to drill into mains to make new connections and to add valves while the main is under pressure — *without shutting off the flow of water or gas.* The operator needs only to check the visual indicators to see how the automatic cut is progressing.

Today, because of the dependable performance of the thousands of products developed by Mueller people for the water and gas industries, the constant, safe control of gas and water is taken for granted.

MUELLER CO. DECATUR, ILL.

Since 1857

CL-12 Drilling Machine for cuts from 2" to 12".

I AM A BOTTLE!

Not just *any bottle*, but a USS National Seamless Steel Bottle. Let me give you some facts while I'm being coated. In the first place, I was made by the world's largest manufacturer of tubular products.

What am I used for? Underground gas storage! Down there, grouped with others like me, I'm safe from storms, high winds and lightning. Also, I'm economical. Why? I'm not much of a maintenance problem. I don't have to be painted periodically. And, since I'm underground, there's no danger of my vibrating or settling.

Here's another thing! If I have to be inspected, or need a minor repair, I can be cut off the line without bothering the gas pressure in the remaining groups of bottles.

And, like all National Seamless Bottles, I was pierced from a solid billet of steel. The highest quality steel, I might add. What's more, I was rigidly inspected and went through severe hydrostatic tests before I was finally shipped.

I guess they're just about finished coating me, so, if you'd like to know more about USS National Seamless Steel Bottles, write to National Tube Division, United States Steel, 525 William Penn Place, Pittsburgh 30, Pa.

USS and National are registered trademarks

The world's largest and most experienced manufacturer of tubular products

National Tube Division of United States Steel

Columbia-Geneva Steel Division, San Francisco, Pacific Coast Distributors
United States Steel Export Company, New York

GAS FIRED WARM AIR SYSTEMS – General Controls builds compatible controls for every type of heating system. *Single source responsibility* for every need, from reliable valves to fashionable room thermostats. Field service by specialists from 44 factory branch offices . . . stocks in conveniently located warehouses throughout the United States, Canada and Western Europe. Call in your General Controls factory representative today.

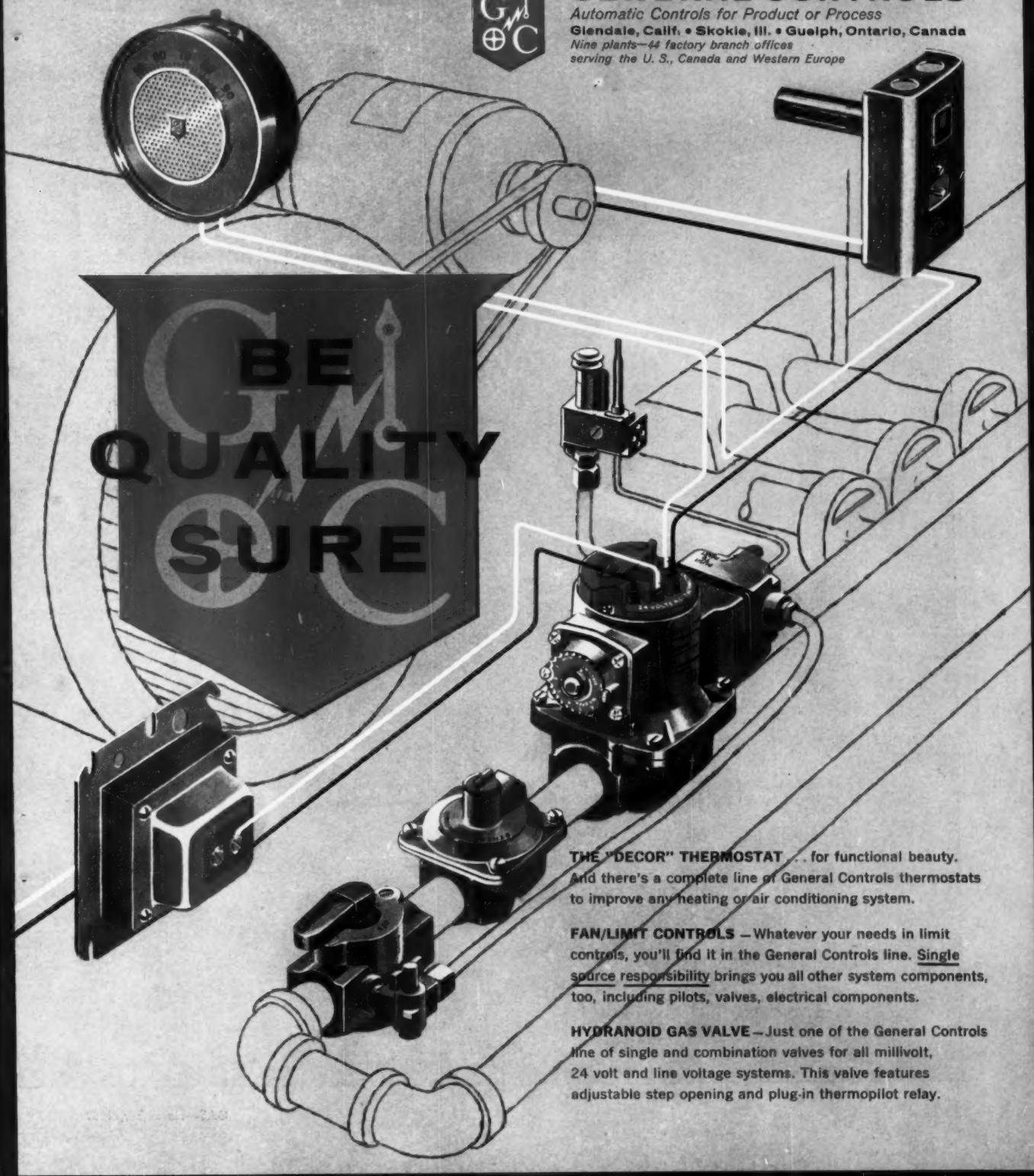
BE QUALITY SURE . . . ALWAYS SPECIFY GENERAL CONTROLS

GENERAL CONTROLS

Automatic Controls for Product or Process

Glendale, Calif. • Skokie, Ill. • Guelph, Ontario, Canada

Nine plants—44 factory branch offices serving the U. S., Canada and Western Europe



THE "DECOR" THERMOSTAT . . . for functional beauty. And there's a complete line of General Controls thermostats to improve any heating or air conditioning system.

FAN/LIMIT CONTROLS – Whatever your needs in limit controls, you'll find it in the General Controls line. Single source responsibility brings you all other system components, too, including pilots, valves, electrical components.

HYDRANOID GAS VALVE – Just one of the General Controls line of single and combination valves for all millivolt, 24 volt and line voltage systems. This valve features adjustable step opening and plug-in thermopilot relay.

MODERN
DANGER
MEN AT WORK

Fill your needs for a century

CAST IRON PIPE

Once in a while a product comes along that is good enough to fill your needs for 100 years and more.

Modern cast iron pipe gives you this reassurance with an unchallenged record of longevity—in dozens of cases, more than 100 years of trouble-free service, a performance unequaled in the gas field.

Improved, modern cast iron pipe gives you even more assurance for the 100 years ahead. Mechanical joints stay bottle-tight through heavy top loads or washouts. Ruggedly constructed cast iron pipe resists a pressure of nine tons per foot in six-inch size, for instance. Even congested overhead traffic won't affect it.

And you needn't worry about corrosion, either—long-lasting corrosion resistance is an outstanding feature of modern cast iron pipe. Convenient lengths make installation easy in even the most cramped quarters.

...All good reasons for you to choose

CAST IRON PIPE

THE MARK OF THE 100-YEAR PIPE

Write for complete information to Cast Iron Pipe Research Association, Thos. F. Wolfe, Managing Director, 3440 Prudential Plaza, Chicago 1, Ill.

Another new development using

B.F.Goodrich Chemical *raw materials*

Now gas comes home through pipe of Geon

The pipe in this natural gas distribution system is made of Geon rigid vinyl. Years from now it will be feeding gas to homes just as efficiently as the day after installation. This pipe stays smooth inside and out because it is not affected by the corrosive influences that affect ordinary pipe. No problems from salt water, chemicals, acid or alkaline soils, or galvanic corrosion.

Conduit or pipe made of Geon provides high tensile and impact strength. It stands up under pressure, resisting effects of fungi, bacteria, moisture, heat or cold. It makes a big hit with installation crews, since it is so light weight and so easy to install.

Engineers are taking advantage of the properties of versatile Geon polyvinyl material for this and many other types of applications. For information, write Dept. AP-5, B. F. Goodrich Chemical Company, 3135 Euclid Ave., Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

1¼" diameter pipe of Geon rigid vinyl is being installed by Illinois Power Company in gas lines leading to homes at Decatur, Illinois. In addition, ¾" vinyl pipe is being inserted in reamed-out 1¼" iron pipe under streets to avoid breaking the pavement to repair leaking gas lines. Kraloy Plastic Pipe Company, Los Angeles, California, makes the pipe. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich GEON polyvinyl materials • HYCAR rubber and latex • GOOD-RITE chemicals and plasticizers

"This is the range I want . . .

It has the new FLAME SET* 'burner with a brain'

". . . and what a *difference* it makes. With this new FLAME SET feature I can adjust the burner flame to suit any size pan! Large or small!

"Say I were going to melt chocolate. I'd need a small pan *and* a small flame to make sure the chocolate doesn't burn. With FLAME SET, I can dial this new 'burner with a brain' to give me the low flame I need. This way I get even temperature-controlled heat and *no* burning. Let's call the salesman."

VMA 6349B *TRADE MARK

From Robertshaw, inventors and pioneers of the "burner with a brain," comes this new design first—FLAME SET. For more information write: Robertshaw Thermostat Division, Robertshaw-Fulton Controls Company, Youngwood, Pennsylvania.

Robertshaw

WR CONTROLS

This advertisement published in HOME FURNISHINGS DAILY

CONTINUING
RESEARCH
REPUBLIC'S NEW INDEPENDENCE, OHIO, RESEARCH CENTER conducts impact, corrosion, slow burst, pulsating pressure, and many other tests to determine and improve the long-term serviceability of SRK Plastic Pipe.

. . . the "Why" Behind the Superiority of Republic SRK

Consider this: Republic SRK Plastic Pipe is the product of a billion-dollar corporation with more than 50 years of pipe-making experience —a corporation that works full-time to bring you superior plastic pipe . . . of the best plastic materials available . . . soon after such materials become available.

At research centers such as Republic's new Independence, Ohio, Laboratory (above), thousands of man-hours—thousands of dollars —are spent in (1) finding the most efficient ways of getting the best out of new plastics, (2) utilizing them to make plastic pipe that performs better . . . longer, and (3) using them efficiently so that you can buy the pipe economically.

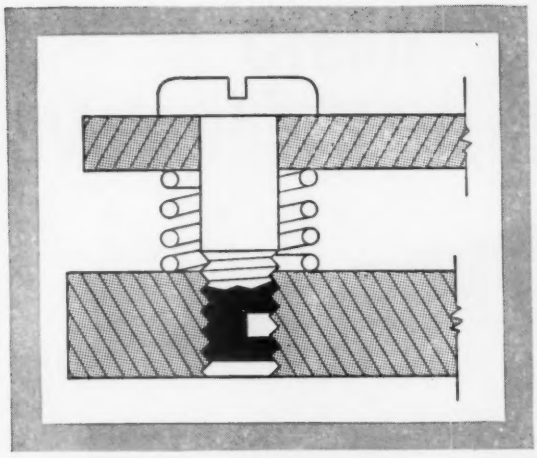
Rigid controls in manufacturing operations guarantee that the high standards of quality developed through research come to you in each and every length of SRK Plastic Pipe. In short, you get the quality you pay for . . . the quality you *need!*

SRK is available in a wide range of pressure ratings and sizes from ½" through 6". Republic also makes Flexible (FE) and Semi-Rigid Butyrate (SRB) for extreme paraffin conditions. All three types offer low friction loss as well as exceptional uniformity and toughness. For complete information, contact your Republic distributor or mail the coupon.

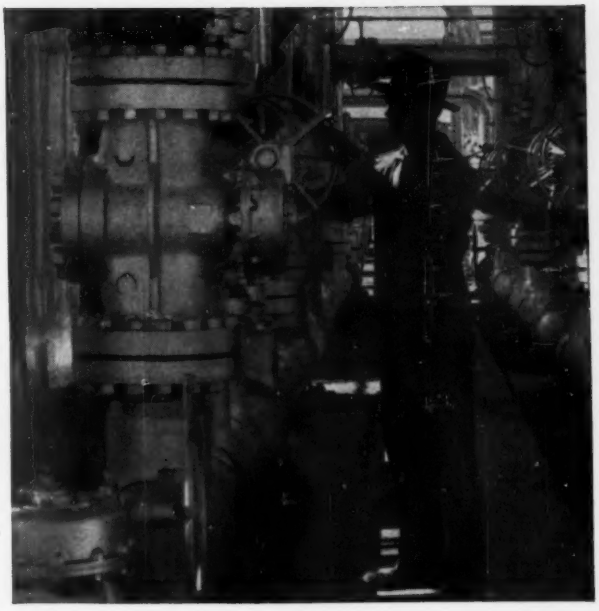
UNAFFECTED BY CRUDE OIL, BRINE, OR NATURAL GAS, Republic SRK costs no more to buy than ordinary pipe. Economical brush-applied solvent and plastic fittings permit almost any type of joint to be made in seconds. SRK cuts with handsaw or hacksaw. Can be installed in combination with existing metal lines.

REPUBLIC STEEL

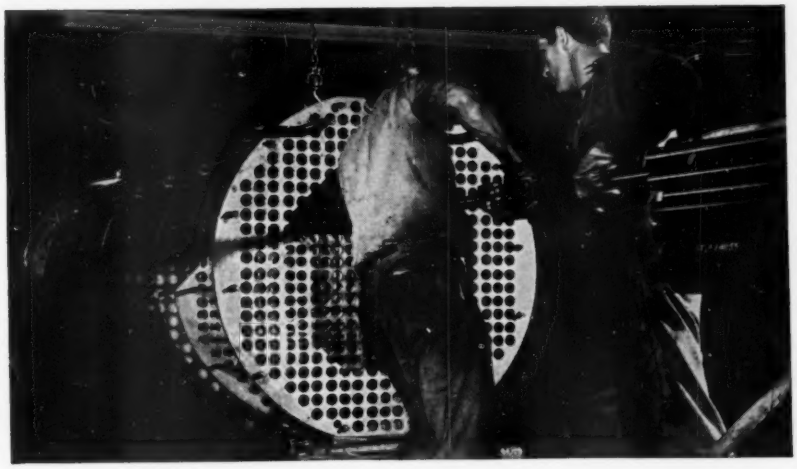
General Offices - Cleveland 1, Ohio



FOR A SINGLE-UNIT ANSWER TO VIBRATION, liquid-sealing, and adjustment problems, try Republic Self-Locking NYLOK® Bolts. Continuous pressure of resilient nylon pellet imbedded in body of bolt forces a tight, metal-to-metal lock between opposite mating threads. Pellet is unaffected by age or moisture. Bolt can be re-used without loss of holding power and locks securely even if not seated. Return coupon for complete information.



FOR GREATER RESISTANCE TO WEAR AND CORROSION, specify Republic Alloy Studs and High Carbon Hex Nuts. Designed to withstand massive forces applied continually or cyclically, without distortion, creep, stretch, or fatigue failure. High tensile strength combined with tough, precision-cut threads, assures maximum holding power, minimum wear, fast back-off to meet maintenance requirements. Clip and mail coupon for full information.



FOR UTMOST UNIFORMITY of strength, ductility, wall thickness, concentricity, and other physical properties, specify Republic ELECTRUNITE® Carbon or Stainless Steel Heat Exchanger Tubes. Made from highest quality flat-rolled steel electrically welded —without the addition of foreign metal— by Republic's famous ELECTRUNITE process. FARROWTEST® electronic testing, offered as an alternate to less positive tests, assures detection of defects of *any* critical size. Send for details.

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World's Widest Range of Standard Steels and Steel Products

REPUBLIC STEEL CORPORATION
DEPT. GS-7993
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:
- ☐ Republic Plastic Pipe
- ☐ ELECTRUNITE Heat Exchanger Tubes
- ☐ Self-Locking NYLOK Bolts
- ☐ Alloy Studs and High Carbon Hex Nuts

Name_____ Title_____
Company_____
Address_____
City_____ Zone____ State_____

Hundreds of Utilities Accepted Our Offer

"FREE TEST THIS NEW HOME GAS FILTER at our expense"

The response has been overwhelming! It has proved to us the great need for this economical gas filter for installation right in the home.

It's the economical way to remove dirt, pipe scale, and other foreign matter from natural gas lines, and keep your customers' appliances operating efficiently.

Thousands are already in use . . . hundreds more are now on test. Why don't you take steps to minimize service calls by stopping dirt—the major source of clogged pilots—right in the home?

Accept our FREE offer

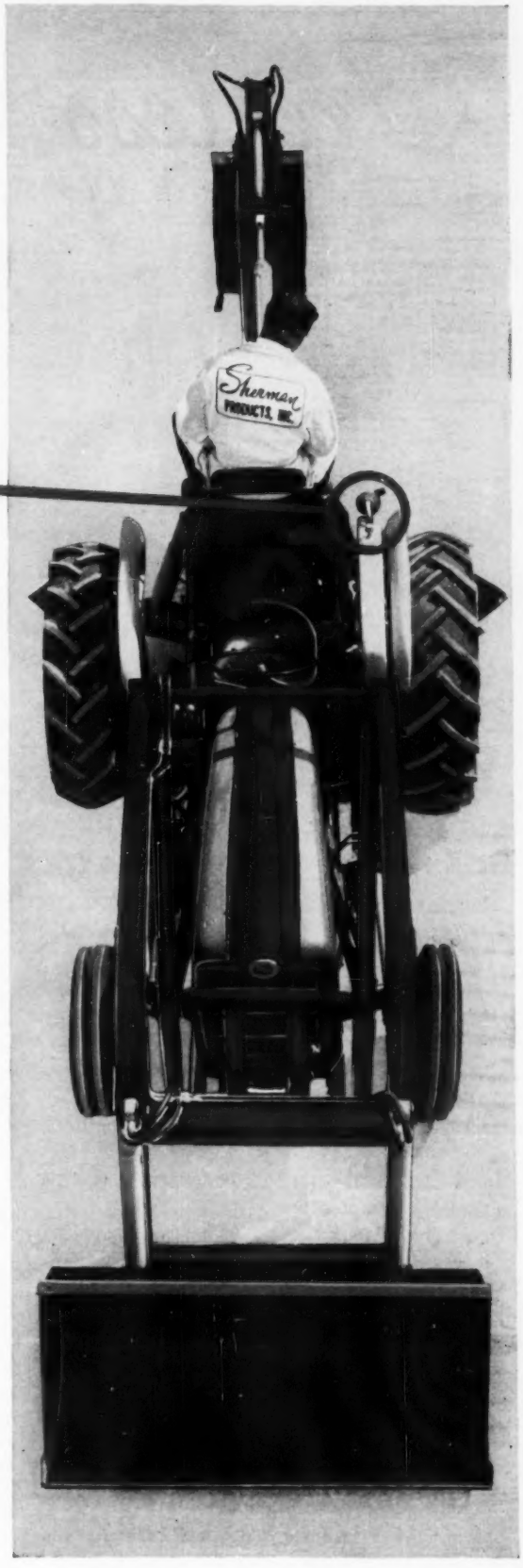
to give you a Staynew Home Gas Filter without obligation. Test it any way you like, and see for yourself its many advantages. All we ask is that you write us on your company letterhead so we are sure the filter goes only to authorized personnel. Address: Dollinger Corporation, 68 Centre Park, Rochester 3, N. Y.

PROTECTOMOTOR

STAYNEW DOLLINGER FILTERS

LIQUID FILTERS • PIPE LINE FILTERS • INTAKE FILTERS • HYDRAULIC FILTERS • ELECTROSTATIC FILTERS • MIST COLLECTORS • DRY PANEL FILTERS • SPECIAL DESIGN FILTERS • VISCOUS PANEL FILTERS • LOW PRESSURE FILTERS HIGH PRESSURE FILTERS • AUTOMATIC VENTILATION FILTERS • NATURAL GAS FILTERS • SILENCER FILTERS

A Clean Hydraulic System Is A MUST!



Only Sherman Power Diggers and Loaders Have the Easy-Check Filter Gauge!

Only the Sherman Digger and Loader have the easy-check filter gauge that guarantees positive hydraulic performance. Yes, now for the first time in the industry, all guesswork is eliminated! For the exclusive Sherman easy-check filter gauge tells you at a glance if your hydraulic filter is giving proper performance!

What does this exclusive Sherman development mean to you, the owner?

Better filtration means:

- Longer equipment life!
- Less downtime!
- Fast filter cleaning without draining tank!

In short, the exclusive Sherman filter gauge means—You Get More For Your Money When You Buy Sherman!

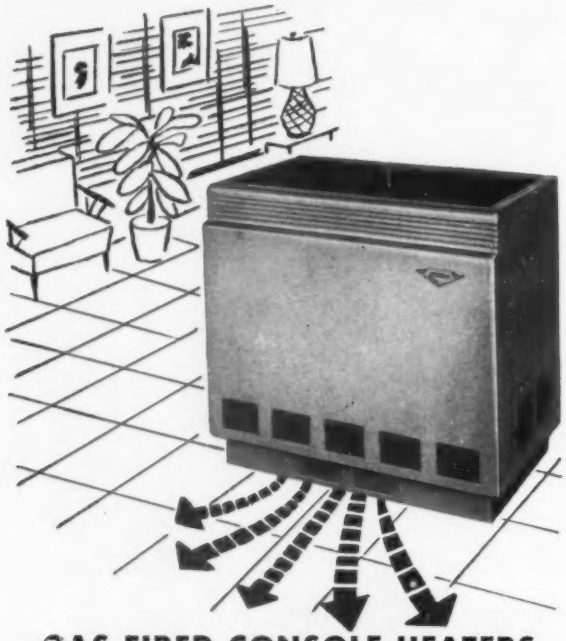
Write for details on *all* Sherman features or for filter gauge Bulletin No. 497.

SHERMAN S PRODUCTS

POWER DIGGERS • LOADERS • SOIL WORKING TOOLS

SHERMAN PRODUCTS, INC., Royal Oak, Michigan

Peerless®
PERFORMANCE



GAS FIRED CONSOLE HEATERS

Radiant and Closed Models 14,000-65,000 B.T.U.
With Counter Flow (Optional)

Enjoy more profitable heater sales with Peerless Console Heaters. Here's how Peerless outperforms other gas consoles . . .

DIRECTIONAL TOP LOUVERS are individual vanes —not stamped slots.

SINGLE CAST IRON BURNER eliminates adjusting problems, annoying noises.

SEAM-WELDED HEAT EXCHANGER is positively gas-tight leak-proof.

OPTIONAL VENTING—horizontal or vertical—is available without additional expense.

Isn't it time *you* moved *up* to Peerless? Write today for detailed literature and specifications.

Peerless® MANUFACTURING DIV.
OF DOVER CORPORATION
LOUISVILLE 1, KENTUCKY

GAS CALENDAR

November

9-11 . . American Petroleum Institute 39th Annual Meeting—Conrad Hilton Hotel, Chicago.
12 . . AGA-Mid-West Public Relations Workshop—Cornhusker Hotel, Lincoln, Neb.
13 . . SGA Distribution Section Round Table Conference—Jung Hotel, New Orleans.
13 . . SGA Accounting Section Round Table Conference—Jung Hotel, New Orleans.
20 . . SGA Sales Section Round Table Conference—Buena Vista Hotel, Biloxi, Miss.

December

3-4 . . SGA Transmission Section Round Table—Sheraton-Dallas Hotel, Dallas.
3 . . NEGA-Mfgr. Dist. Div. Sales Managers Conference—The Maridor, Framingham, Mass.

1960

January

8 . . SGA Sales Section Round Table Conference—Paso Del Norte Hotel, El Paso.
15 . . SGA Employee Relations Conference (Accident Prevention)—Captain Shreve Hotel, Shreveport.
20 . . NEGA Operating Division—Sheraton Plaza, Boston.
22 . . Oklahoma Utilities Association Accounting Section—Tulsa, Okla.
28 . . NEGA Accounting Division—Statler Hilton, Boston.

February

29-Mar. 2 . . AGA General Management Section Conference—Pittsburgh-Hilton Hotel, Pittsburgh.

March

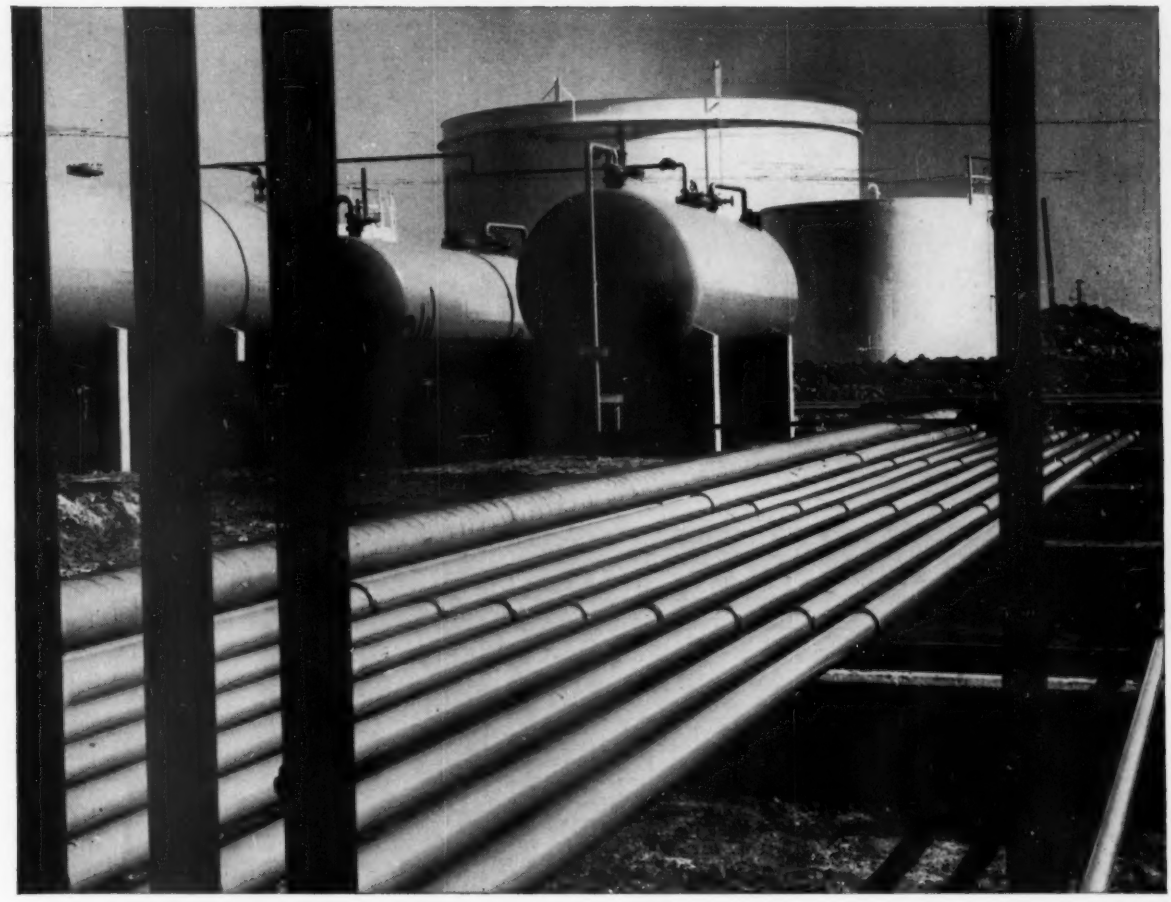
14-18 . . National Association of Corrosion Engineers Annual Convention—Dallas.
21-23 . . Mid-West Gas Association Annual Meeting & Convention—Hotel St. Paul, St. Paul, Minn.
24-25 . . NEGA Annual Meeting—Hotel Statler, Boston.
24-25 . . Oklahoma Utilities Association Annual Convention—Biltmore Hotel, Oklahoma City.
30-April 1 . . GAMA Annual Meeting—The Greenbrier, White Sulphur Springs, W. Va.

April

5-7 . . AGA Sales Conference on Industrial & Commercial Gas—The Shamrock-Hilton, Houston.
8-9 . . Florida-Georgia Gas Association Convention—Biltmore Hotel, Palm Beach, Fla.
19-21 . . Southwestern Gas Measurement Short Course—University of Oklahoma, North Campus, Norman, Okla.
19-21 . . AGA Research & Utilization Conference—Hotel Carter, Cleveland, Ohio.
21-22 . . Indiana Gas Association—French Lick-Sheraton Hotel, French Lick, Ind.
25-27 . . AGA-EEI National Conference of Electric & Utility Accountants—Roosevelt & Commodore Hotels, New York.
25-27 . . Southern Gas Association Annual Convention—Galveston, Texas.

May

9-13 . . AGA Commercial Gas School—Edgewater Beach Hotel, Chicago.
9-13 . . AGA Operating Section, Joint Distribution & Transmission Conference—Hotels Roosevelt & Jung, New Orleans.



Solved! Gas distribution problems in networks of up to 1000 pipe sections and 400 loops by Hardy Cross method!

Royal Precision

LGP-30

World's largest-selling engineering and scientific computer

Maximum efficiency in distribution, transmission and storage is now a reality with the powerful LGP-30 electronic computer marketed by Royal McBee. Faster, more reliable *and more economical* results are being obtained in such typical problems as traverse closure, gas reservoir calculations for storage and production wells, high pressure gas transmission studies, mechanical design of pipelines and compressor stations. Answers are printed out in directly usable form—there's no deciphering required.

The LGP-30 is ideally suited to gas utility problems. Its unusually large (4096 word) memory provides the efficiency and flexibility of stored-program operation required to solve complicated problems involving large amounts of instructions and variable data. It is the easiest computer to program and operate. Your engineers solve their own problems at desk-side—without the need for computer specialists. User-engineers develop a man-machine relationship to the point where the LGP-30 becomes an extension of their own thinking capacity.

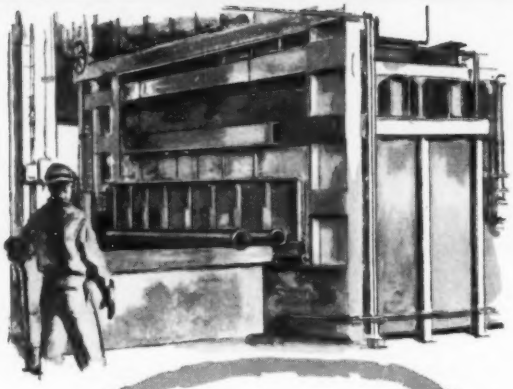
The LGP-30 is low in cost—about the price of a good engineer. No site preparation is necessary. Just plug it into the nearest wall outlet and it is ready to go to work. Customers have access to an extensive library of programs and sub-routines, as well as an active users organization.

Royal Precision Corporation

Royal Precision is jointly owned by the Royal McBee and General Precision Equipment Corporations. LGP-30 sales and service are available coast-to-coast, in Canada and abroad through Royal McBee Data Processing offices. For complete information on gas utility applications, write for brochures S-526 and S-420 to **ROYAL McBEE CORPORATION,** data processing division, Port Chester, N. Y.

THE BLACKSMITH . . . legendary figure of other days, heated his metals in a crudely built forge.

BASIC...but better than ever today



TODAY . . . dependable gas supplies heat for thermostatically controlled heat treating furnaces such as used for our cast iron pipe.

Cast iron pipe's reputation for long life was won the hard way—by proved performance in the field.

Throughout the country today many cast iron gas mains, a century and more old, are still serving.

This outstanding record is the result of cast iron's inherent quality. Quality that we, for one, maintain at maximum levels by supervising every production step from mine to finished product.

You can depend on U. S. Pipe. It is quality-controlled in manufacture to insure top performance in the main.

SERVICE IS BUILT INTO CAST IRON

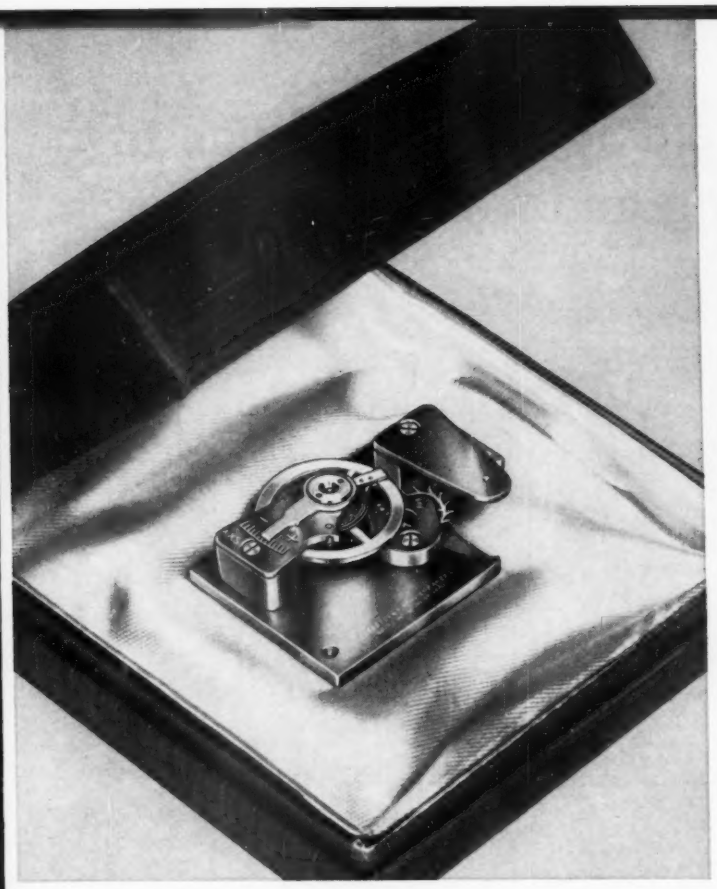
- **Standardized mechanical joints are bottle-tight for usual gas distribution pressures . . . and for all types of gas.**
- **Centrifugally cast pipe is tough, strong and uniform.**
- **Joint design allows for deflection during and after installation.**
- **Service connections are easily made**
- **Long life a matter of record.**
- **No shortages. Cast Iron Pipe is immediately available.**

U. S. PIPE AND FOUNDRY COMPANY
General Office: Birmingham 2, Alabama

A WHOLLY INTEGRATED PRODUCER FROM MINES AND BLAST FURNACES TO FINISHED PIPE.

U.S. cast iron **PIPE** CAST IRON

GEM



Now there's a New "Jeweled" Escapement in ROCKWELL CHART DRIVES

for greater accuracy and longer life

This jeweled movement brings fine watch quality to instrument timing

SPEED CHANGING TURRETS PROVIDE SEVEN DIFFERENT ROTATION RATES

The basic Rockwell Chart Drive has a main arbor rotation rate of 7 days. Economical snap-on turrets permit changing to 8-day, 15-day, 16-day, 24-day, 30-day, 31-day, and 24-hour rotation. No tools or special skills are required. You can even change chart rotation without removing the drive from the instrument.

The introduction of a jeweled movement—the first ever used on a general industrial timing device made in the United States—makes the Rockwell more accurate than any unjeweled chart drive could possibly be. In addition to offering fine watch quality, the jeweled escapement requires less power to operate and is extremely durable, since seven hard jewel surfaces are provided to limit friction and wear.

You will benefit in many ways by using these jeweled movement chart drives for powering all your recording instruments. They adapt readily to fit into practically any instrument case while speed-changing turrets (see left) permit changing rotation rates at will. Write for full information. Rockwell Manufacturing Company, Instrument Division, Pittsburgh 8, Pa.

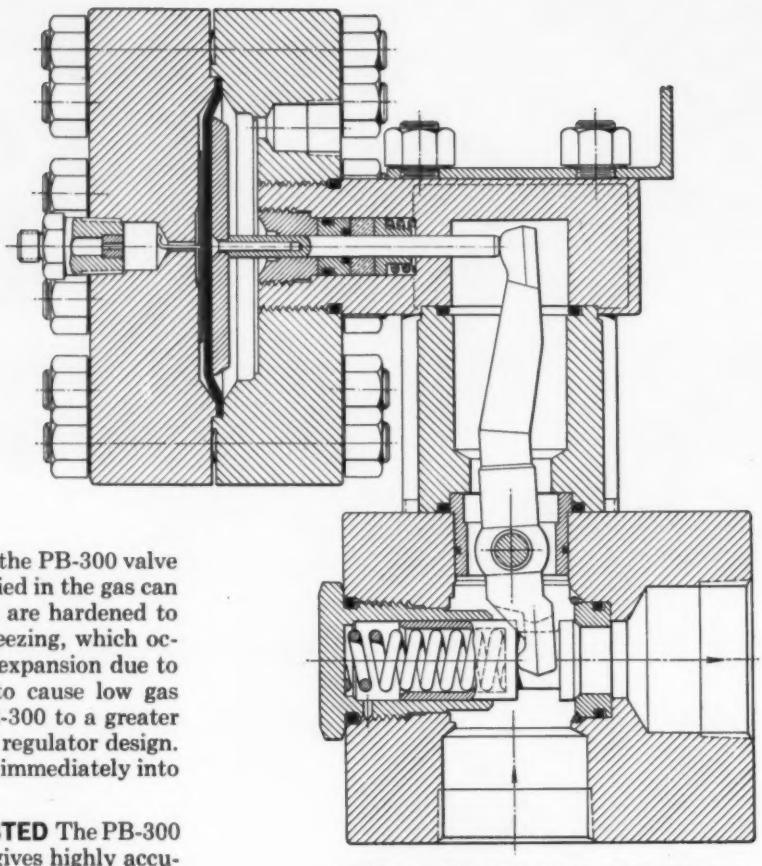
JEWELED CHART DRIVES

another fine product by

ROCKWELL

GROVE PB-300... Remarkable resistance to sand cutting and freezing

Adapts easily for Pressure Regulation, Back Pressure Service and Automatic Over Pressure or Under Pressure Shutoff



Available in both Angle (shown above) and In-line models with 2" screwed or ring joint flange connections. Inlet pressures to 6000 psi and controlled pressures to 3000 psi.

The flow of high pressure gas through the PB-300 valve is *away* from working parts. Sand carried in the gas can attack only the valve and seat which are hardened to resist cutting and easily replaced. Freezing, which occurs in ordinary regulators when gas expansion due to pressure reduction is great enough to cause low gas temperatures, is minimized in the PB-300 to a greater extent than is possible with any other regulator design. Gas flow through the valve is directed immediately into the unobstructed downstream line.

HIGHLY ACCURATE-EASILY ADJUSTED The PB-300 is very easy to install and adjust. It gives highly accurate pressure control and is one of the most dependable regulators on the market today. Effects of ambient temperature changes can be greatly reduced by burying the cylinder containing the dome loading pressure.

VERSATILE The PB-300 can be used for pressure reducing, back pressure regulation, or as an automatic over *or* under pressure shutoff valve without any change in parts or construction. Merely attach the control lines for the service desired. Addition of a small pilot valve converts it to an automatic over *and* under pressure shutoff valve.

The Grove PB-300 uses the field proven Powreactor Dome principle—demonstrated over the years in thousands of regulating and well head protection installations.

Write today for Bulletin 126-B giving complete information

GROVE VALVE and REGULATOR COMPANY

A Subsidiary of Walworth

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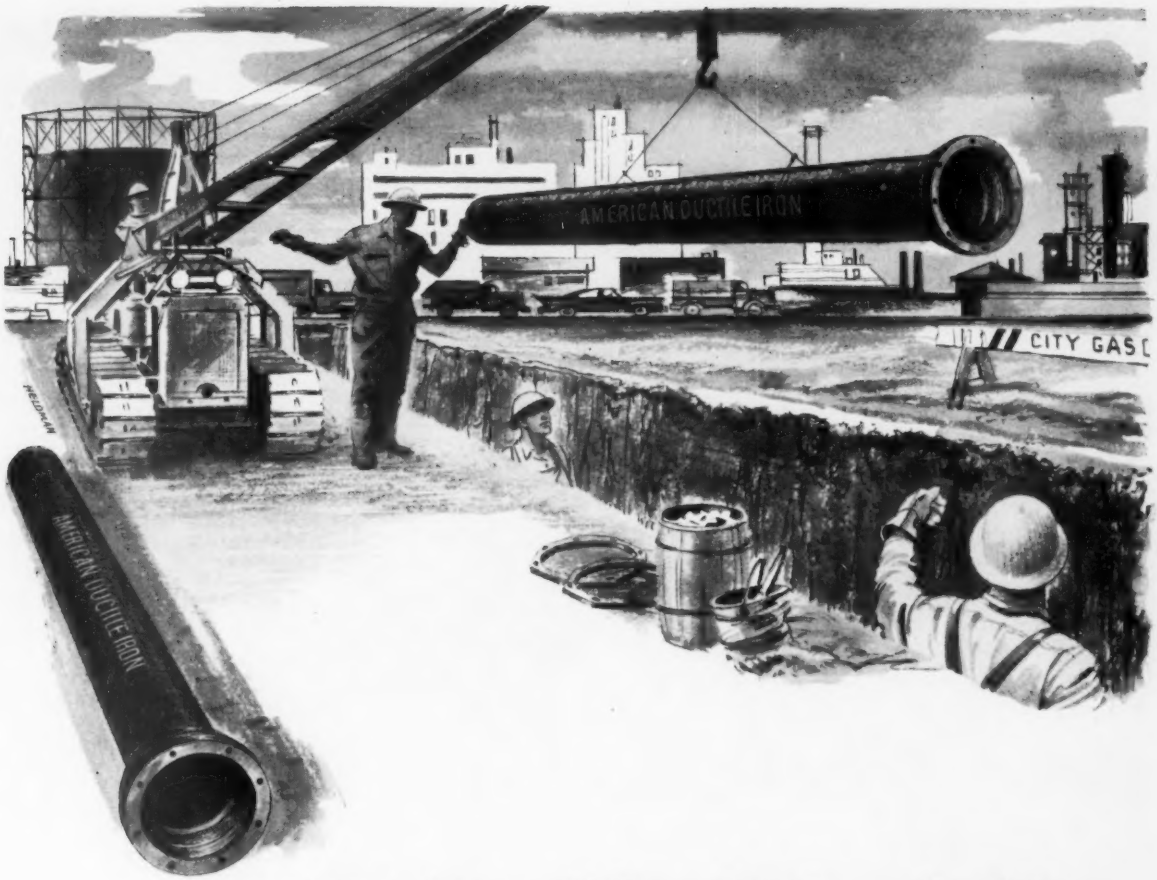

Provides additional factors of safety...

AMERICAN Ductile Iron PIPE

with extra strength and toughness

Big **extras** are the reasons American Ductile Iron Pipe is ideal for the tough requirements of gas service. Produced from a new family of cast metals, it has extra strength to resist impact—yet it **actually bends** under stress.

American Ductile Iron has the proven corrosion resistance of gray cast iron . . . eliminates the inconvenience and expense of wrapping or other special protective coatings. Its extra strength, toughness and its easily assembled, bottle-tight Double-X Mechanical Joint add up to durability and important **extra** factors of **safety.**

Get full facts about this new super-service development in piping from your American Cast Iron Pipe Company representative now.

GEM

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BIRMINGHAM ALABAMA

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New York City • Dallas
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You get a full measure of value with a Holan Gas Meter Body

Versatility is one measurement of value—and on that score the Holan 75-C Gas Meter Body really measures up.

The 75-C is built for gas meter installation—but it is ideal for delivery and installation of appliances and general service work.

Six 10-light meters ride in cushioned safety to the job. Two are stored in the left-hand vertical compartment; four are carried inside the body on a sturdy meter platform.

Like other Holan bodies, the 75-C has flush-type door handles with key locks and safety-tread steel floor.

Tubing, connections, conduit and miscellaneous parts and equipment are carried in vertical and horizontal compartments. Optional lower rear compartments are available on either or both sides.

Long lengths of pipe can be carried in the pipe rack, held securely in place with hold down clamps. A rear-mounted pipe vise bracket and folding pipe support at front make easy work of on-the-job cutting and threading.

Your Holan Field Representative would be happy to supply more details...or write us for literature.

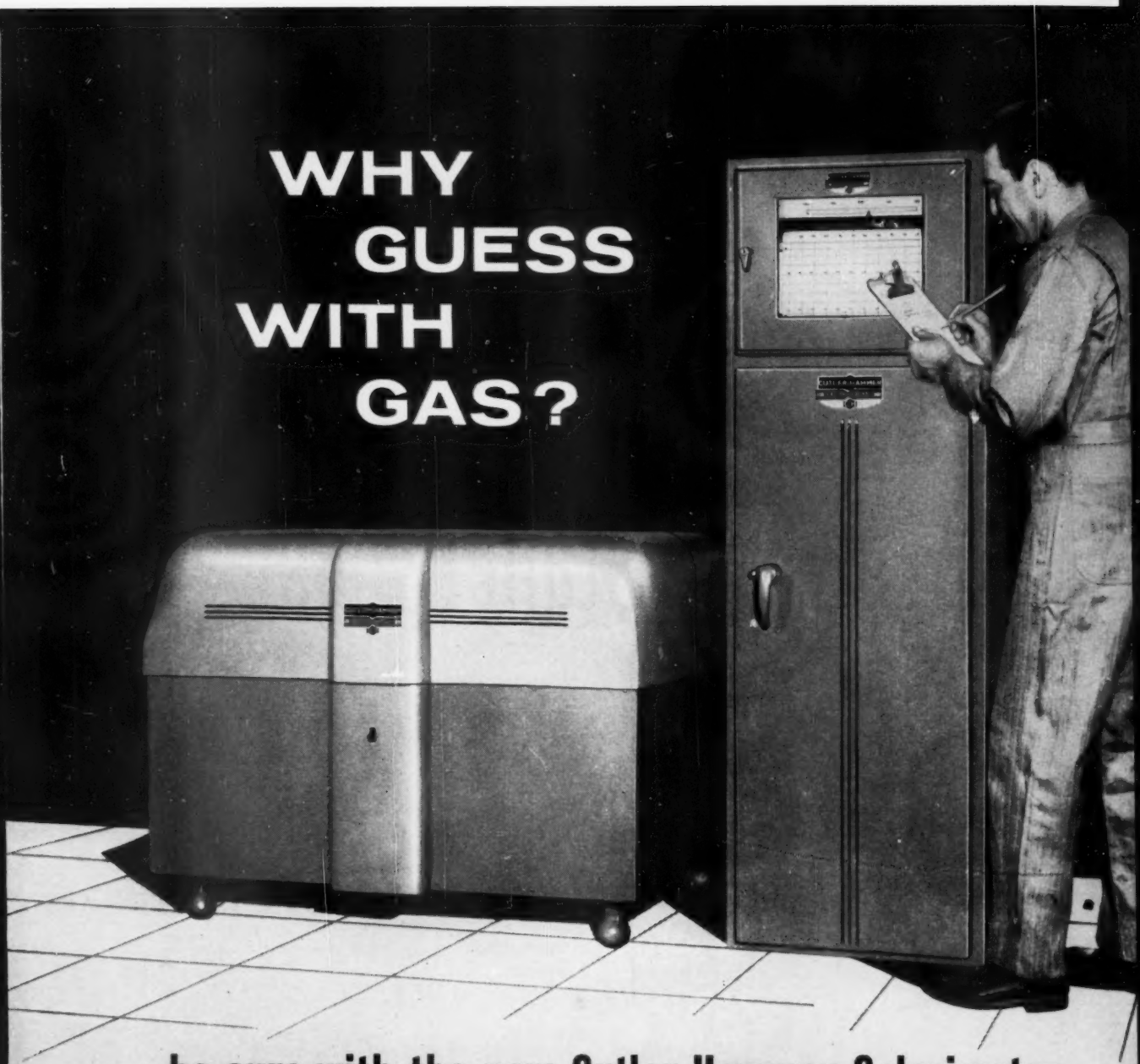
Holan Corporation, 4100 West 150th Street, Cleveland 35, Ohio
Plants in Cleveland, Ohio; Griffin, Georgia; Phoenix, Arizona

Holan

Subsidiary of THE OHIO BRASS COMPANY

HOLAN

WHY GUESS WITH GAS?



. . . be sure with the new Cutler-Hammer Calorimeter

Buying gas without accurate knowledge of the exact heat content is "blind buying" . . . a sure way to pay too much for too little. Selling gas without knowing the exact heat content is "blind selling" . . . and almost always results in supplying *more* heating value than the contract specifications require "just to be on the safe side." Both practices can undermine profits.

Whatever your interests or requirements may be, it doesn't pay to guess with gas. You can avoid the perils of blind buying and blind selling by using the new Cutler-Hammer Calorimeter. With guaranteed accuracy of 0.5%, this dependable calorimeter reveals and records the exact Btu content per standard cubic foot of gas . . . regardless of pressure, temperature, or flow variables.

Modernize your gas measuring facilities now with the new Cutler-Hammer Calorimeter. The savings afforded by its increased accuracy will quickly return your investment.

Write or wire today for the new illustrated catalog, EN48-W284. Cutler-Hammer Inc., Milwaukee 1, Wisconsin

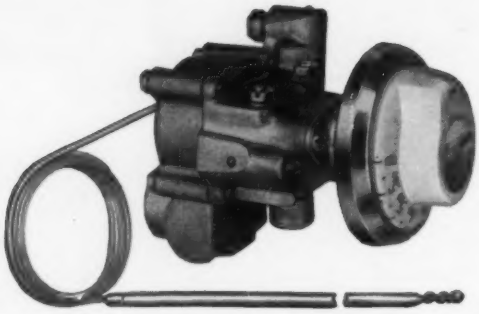
CUTLER-HAMMER CONTROL CH

CUTLER-HAMMER

Cutler-Hammer Inc., Milwaukee, Wis. • *Division:* **Airborne Instruments Laboratory.** • *Subsidiary:* **Cutler-Hammer International, C. A.**

Associates: Canadian Cutler-Hammer, Ltd.; Cutler-Hammer Mexicana, S. A.; Intercontinental Electronics Corporation.

NEW WILCOLATOR **MODEL X** CONTROL



Wilcolator Model X
High-Capacity Gas Valve
and Oven Thermostat

Temperature range:
200-550°F, plus broil

AGA rating, Btu/hr:
Manufactured gas—49,000
Natural gas—72,500
LP gas—154,400

Lower installed cost

These features save assembly time, help cut labor cost

1. Gasket already bonded to flange fitting. Saves handling and stocking an additional part.
2. Thermostat body self-locating on flange plate. Automatically aligns bolt holes.
3. Flange bolts and lockwashers come pre-assembled. Eliminates extra parts.
4. Snap-on dial and bezel. No setscrews or other fasteners to tighten.
5. Choice of four different outlet casting positions. Simplifies hookup, eliminates need for special fittings.

The new Wilcolator Model X control is designed to be installed quickly and easily on any gas range . . . with a minimum number of extra fittings. By speeding up assembly operations, it helps save labor and time, thus reducing the installed cost of the thermostat. For complete information on this new high-capacity oven control, request Bulletin 547. (Ranges with automatic oven ignition, Bulletin 548 —Model XC.)

Thermostats for Every Heating and Cooling Application

THE WILCOLATOR COMPANY
1001 NEWARK AVE., ELIZABETH, N. J.
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THE Wilcolator COMPANY

SAVINGS UP TO 19%... PROVEN BY 750 MILLION MILES OF USE!

LOVE THAT **LARK** *BY STUDEBAKER*

The Lark is America's most economical car—chosen for fleet use by more than 175 utility companies ➤ First cost is as much as 12% lower—operating and maintenance costs average 19% lower than other cars in regular fleet use ➤ High resale value too ➤ Full line of models: 2-doors, 4-doors, Wagons, and a special Heavy Duty sedan, the toughest-built passenger car in the country ➤ Six cylinder or lively V8, with top mileage economy on regular gas ➤ Parks in 3 feet less space at the curb or in the garage, and a dream to handle ➤ *Proven in actual service by 750 million miles of owner and fleet driving!*

BUDGET-WISE BUYERS
LOVE THAT
LARK
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TELL US MORE ABOUT LARK SAVINGS!
Fleet Sales Division, Studebaker-Packard Corp., South Bend 27, Indiana
( ) Send us informative literature only
( ) Have a factory representative call me for an appointment

NAME _____
PLEASE PRINT
TITLE _____
COMPANY _____
ADDRESS _____

YOU SELL MORE BECAUSE...
YOU HAVE MORE TO SELL

WITH THE JOHN WOOD FULL LINE

plus

HIDE-A-WAY

SELLS THOSE HARD-TO-FIT HOT WATER INSTALLATIONS

John Wood's Hide-A-Way gas water heaters fit where others can't—where space is limited and dependable hot water service is a "must." Makes sales where you never sold before. Glasslined and galvanized models.

JOHN WOOD COMPANY

Heater and Tank Division

Conshohocken, Pennsylvania • Chicago, Illinois

QUALITY PRODUCTS JOHN WOOD SINCE 1857

Today's smallest two-way mobile radio - actual size!

New General Electric Transistorized Progress Line

General Electric's new Transistorized Progress Line will fit in more places, in more different positions, than any other two-way mobile radio you can buy today.

Not only is this the world's smallest, lightest commercial two-way mobile radio, but standby battery drain is so low you need never turn off your TPL mobile unit, just like the clock in your car. You install no special generator, use less gas, require fewer engine jobs.

TPL is the first two-way radio that transmits up to 75 watts of power in high band . . . the first that really fits under the dash . . . the first to realize the full benefits of transistorized design (no more than four tubes) . . . the first to eliminate bulky cables through new one-piece design of receiver control and transmitter . . . the first with shielded dirt-free ventilation.

The new General Electric TPL ushers in a new era of convenience and reliability in mobile communications. Don't miss all the exciting details. Write General Electric Company, Communication Products Department, 38119 Mountain View Road, Lynchburg, Virginia.

GENERAL ELECTRIC

Communication Products Department

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SCOTCHRAP

BRAND

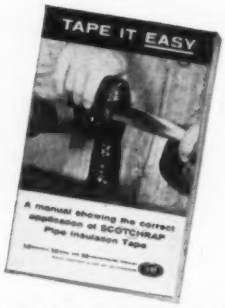
PIPE PROTECTION

Tapes are TOUGHER!

Proved by 200-hour torture test!

Each of the five lengths of pipe shown was covered with a different protective coating—both tapes and mill coatings. They were then fastened in a barrel containing abrasive tumbling chips and continually tumbled for 200 hours. This unretouched photo shows the results: only the "SCOTCHRAP" Pipe Protection Tape, far right, survived intact!

This controlled test was designed to measure the resistances of various coatings to backfilling and soil stresses. It clearly demonstrates the superior abrasion and puncture resistance and excellent bond strength you get *only* with "SCOTCHRAP"—the toughest polyvinyl chloride plastic tape. These properties are so superior that with normal care, no protective overwrap is needed. Add the excellent electric properties, and you have the reasons why we believe "SCOTCHRAP" is the best total coating buy you can make.



SEND FOR FREE MANUAL!
New "Tape it Easy" booklet gives application methods, useful specifications, for "SCOTCHRAP" Pipe Protection Products. Write 3M Co., St. Paul 6, Minn., Dept. EAL-119.

FOR MAXIMUM ABRASION RESISTANCE . . .
EXCELLENT PUNCTURE RESISTANCE . . .
MAXIMUM RESISTANCE TO SOIL STRESS . . .

***PLUS* EXCELLENT ELECTRICAL PROPERTIES**

SPECIFY

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SCOTCHRAP Pipe Protection Products

BRAND

The term "SCOTCHRAP" is a registered trademark of Minnesota Mining and Mfg. Co., St. Paul 6, Minn. Export Sales Office: 99 Park Avenue, New York 16, N.Y. In Canada: P.O. Box 757, London, Ontario.

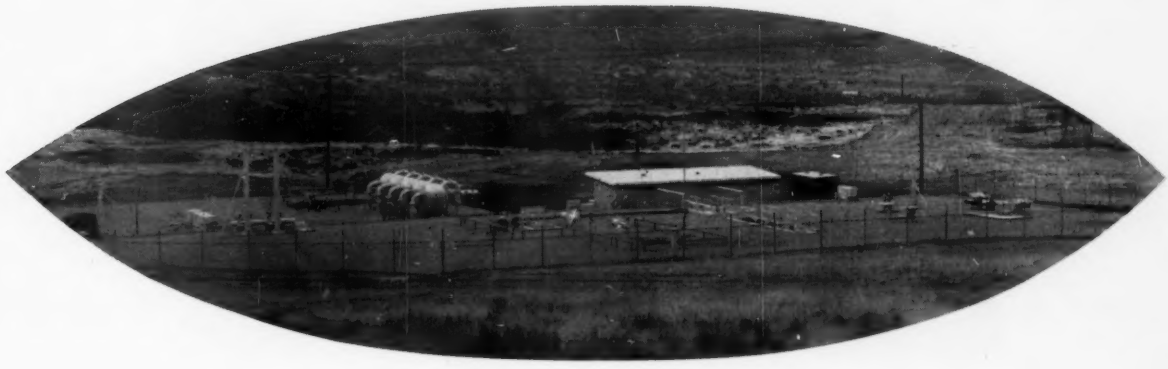
MINNESOTA MINING AND MANUFACTURING COMPANY

. . . WHERE RESEARCH IS THE KEY TO TOMORROW

3M COMPANY

GAS

NOVEMBER 1959



QUIGLEY STATION:

A Pacific Lighting System approach to

REMOTE CONTROL

Southern California's facilities

By D. C. ANDERSON, Newhall Division Engineer • Southern California Gas Co.

QUIGLEY station is a combined metering and regulating station at the Los Angeles terminus of the 30-in. OD pipeline extending from Needles at the California-Arizona border through the Mojave desert and Antelope valley to the Los Angeles metropolitan area. It is not the largest station in the system supplying out-of-state gas to southern California, but it is certainly the most complex, both from the standpoint of the number of functions performed, and of the instruments and control equipment required to perform these functions. Quigley station and the 30-in. Needles pipeline are jointly owned by the Southern California and Southern Counties Gas companies. A recently completed 34-in. pipeline from

GAS exclusive

Pacific Lighting Gas Supply Co.'s facilities are described in detail in Part 2 of this article, beginning on page 103.

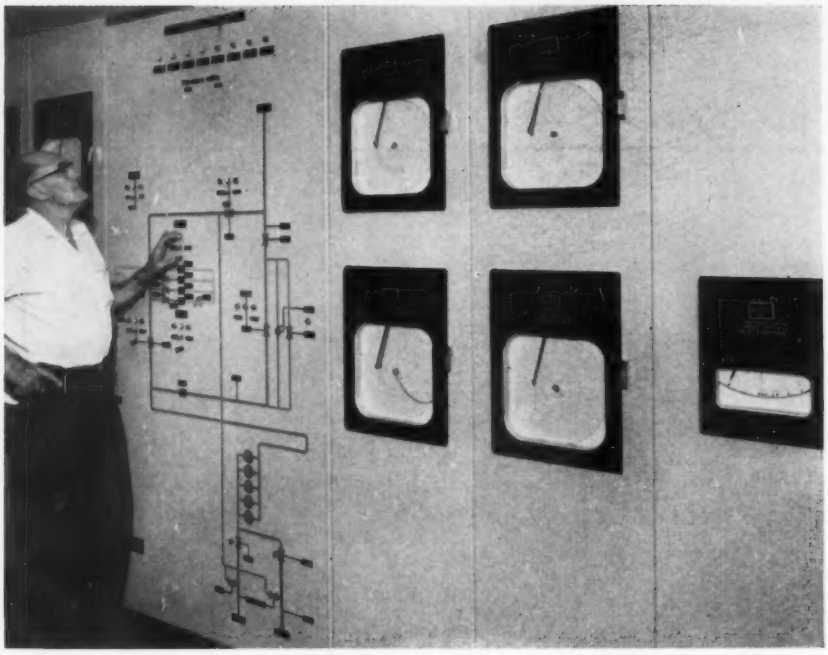


Fig. 1. Graphic panel and portion of instrument panel at Newhall station from which Quigley is monitored and remotely controlled.

Coles Levee, Calif. (near Taft) also terminates at Quigley station. This line is owned and operated by the Pacific Lighting Gas Supply Co.

The station is located in an undeveloped area a few miles north of the city limits of Los Angeles. It is next to a small producing oil field. Local history has it that a "confidence man" was jailed years ago for fraudulently selling small parcels of land in this area as valuable oil land. By the time oil was actually discovered, owners and records had scattered to the far corners of the country. Small independent producers swarmed into the area, many with a "Get the oil out now—worry about who owns it later" attitude. The resulting chaos engendered various names for the area, including "Mad Mountain" and "Confusion Hill." Neither of these was considered appropriate for the station, so the more dignified "Quigley" was taken from the name of an adjoining canyon. The service address for the telephone and leased supervisory circuits, however, is still listed by the telephone company as "Confusion Hill."

Quigley station was designed and built in 1957 to measure, clean, and control gas received from these two pipelines before delivering it to two 30-in. pipelines leading on into Los Angeles and connecting with the 30-in. Texas pipeline system supplied through Blythe, Calif. The current design capacity of the station is 23 MMcf per hr peak and 4 MMcf per hr minimum. Maximum through-put from the Needles Pipeline to date has been about 400 MMcf per day. The overall design of Quigley station provides for measurement and control of a third pipeline through the station. All piping and most control valves are buried. Vaults are provided for access to orifice meter fittings and to some of the control valves. The balance of the buried valves have extension shafts to place the actuators aboveground.

Quigley station is unattended. It is remotely controlled from Southern California's Newhall operating base, which is about two miles from Quigley. Newhall station is a control point on the three companies' Coastal and San Joaquin valley system. For many years these were the chief source of gas for the Los Angeles Basin area. Gas dispatchers are on duty continuously at this location. They operate both Newhall and Quigley stations in accordance with instructions received from the three companies' system gas coordinator's office.

Concurrently with construction of Quickley station, an instrument board containing recording receivers; controller set point transmitters, and a graphic panel depicting the controlled station piping was installed at Newhall station. The graphic panel at Newhall provides both indication and control through the use of color coded piping and component symbols, engraved name plates to identify various elements of the station, control switches and signal lights adjacent to the symbol for the controlled elements, valve position signal lights, and audible and visual alarm signals. (*See Fig. 1.*) The alarms include loss-of-the-signal circuit, station over-pressure, incorrect controller setting, and manual operation of a controlled function from the remote end.

The control loop between Newhall and Quigley stations consists of tone-type multiplexing supervisory equipment manufactured by Control Corp. (Minneapolis), connected by a single pair of leased telephone wires. This equipment uses four of five different audio

tones transmitted in a definite sequence to initiate each control function. A different sequence is automatically selected and transmitted for each function when the dispatcher keys the function switch. Accidental initiation of control functions is unlikely because the control loop is not complete unless the proper sequence is transmitted. This process can be likened to a tumbler-type lock, which cannot be opened without the right key. Five tuned vibrating reed relays at the remote end respond to the signal sequence transmitted by the four tone generators at Newhall. For telemetering, a single oscillator generates a signal for each message channel which is passed to a matching frequency responsive unit at Newhall. Audio tones used range from 310 cps to 2592 cps. The complete supervisory and telemetering package provides 12 control functions, indication of 16 operations and valve positions, 14 channels for continuous telemetering, and three alarm points. Facilities to light the various valve position and control function indicating lamps are also included.

Bristol pulse-duration telemeter transmitters and receivers are used for pressure and flow indications. So-called "Meta-set" set point positioning is used in the pressure and volume controllers. With this type, the dispatcher has only to set a controller index in the receiver to the desired control point, as in a local controller, and push a button. The set point of the controller at the remote location is positioned by pulse duration signals identical to those used in conventional telemetering. One feature of this type set point positioning when used with this equipment is that the transmitter and receiver drive motors operate only during the positioning operation. Limit settings and other control modifications are incorporated to prevent abrupt changes in the controlled function.

Station piping at Quigley is designed for three maximum operating pressures. The inlet portion of the station is designed for an MOP of 936 psig, which is the same as the incoming pipeline. A first stage of pressure reduction is provided at the inlet of the station to permit design of the "working" portion of the station for an MOP of 650 psig. This area includes meter tubes, scrubbers and a major share of the station's valves, fittings, and piping. A second stage of regulation at the outlet of the station provides control of the delivery pressure to the downstream piping system, i.e. the Los Angeles metropolitan area. This system has a normal MOP of 465 psig. The original operating plan for the station called for a fixed station pressure of about 500 lb between the two stages of regulation. A recent modification of the station added remote differential control to the first stage of regulation. Differential sensing for this controller is taken at the existing 30-in. orifice meter fitting. The dispatcher at Newhall is able to remotely control the volume received from the Needles line, volume received from or delivered to the Coles Levee line, and the pressures of the two outgoing lines.

• Flow sequence

A 24 in. x 30 in. mainline valve, the 24th on the line from Needles, serves as the entry gate to the station. (*See Fig. 2*). This valve is equipped with a conventional gas-operated Nordstrom (Rockwell) cast steel cylinder with an auxiliary handwheel operating mechanism. Gas at line pressure is supplied to both ends of the cylinder, with a restricting orifice in the piping to the "open" side of the piston. The valve is normally open. But it will close automatically if either of two things happen. One of these is excess flow in either direction, such as might be caused by a rupture in the station or in the pipeline upstream from the station. A pair of Reliance Type X-196 valves sense the differential across the mainline valve itself. A differential in excess of the set point of either of the X-196 valves will cause it to trip, exhausting one end of the equalized cylinder. The resulting unbalance causes the valve to close. The X-196 valves must be manually reset once tripped.

A second device closes the mainline valve in the event failure of the first stage of regulation overpressures the central portion of the station. It consists of a Fisher Wizard snap-acting controller, which operates a small diaphragm-operated three-way valve to exhaust one end of the cylinder in the event the pressure on the "working" or central portion of the station exceeds 600 psig. This action also causes the valve to close. Once closed, the mainline valve remains closed until it is manually re-opened. The cylinder piping is equipped with valves for this purpose.

Incoming gas then enters a header supplying the three valves in parallel which comprise the first stage of station regulation. Valve sizes are 6-in., 12-in., and 24-in. x 30-in. All are equipped with Ledeen actuators and Foxboro Power Positioners to provide modulating control. The 6-in. has a tandem actuator, the 12-in. and the 24-in. x 30-in. have Quad actuators. Oil is used in two of the cylinders on each of the Quads and in the inboard ends of the two cylinders on the tandem actuator to provide hydraulic damping. Speed control valves in the oil lines regulate the damping rate. This group of valves is designed to control the rate of flow received from the Needles pipeline with an over-ride to limit the pressure in the central portion of the station to 475 psig. *(See Fig. 3.)*

Flow control is accomplished by a remotely positioned Bristol differential controller (*see Fig. 4*). The 30-in. orifice meter fitting which measures gas received from the Needles line provides the input signal to this controller. The output goes to a Foxboro positioner on each of the 6- and 12-in. valves. Split range operation is used. A 3-9 psi signal from the controller will throttle the 6-in. valve from closed to fully open. If the capacity of the 6-in. valve is not sufficient, the output signal will increase, causing the 12-in. valve to throttle from fully closed to open on a 7-15 psi signal. The output signals from the flow controller and from a Fisher Reverse Acting Wizard acting as a pressure controller, are fed simultaneously to a Moore Model 61-F relay. If the flow setting chosen exceeds the downstream demand and station pressure increases to 475 psig as the system packs, the override feature functions in the following manner: As the station pressure increases to the set point of the Wizard Controller, its output decreases. The Moore relay selects the lower of the two signals (in this case the Wizard's), causing the 6-in. and 12-in. valves

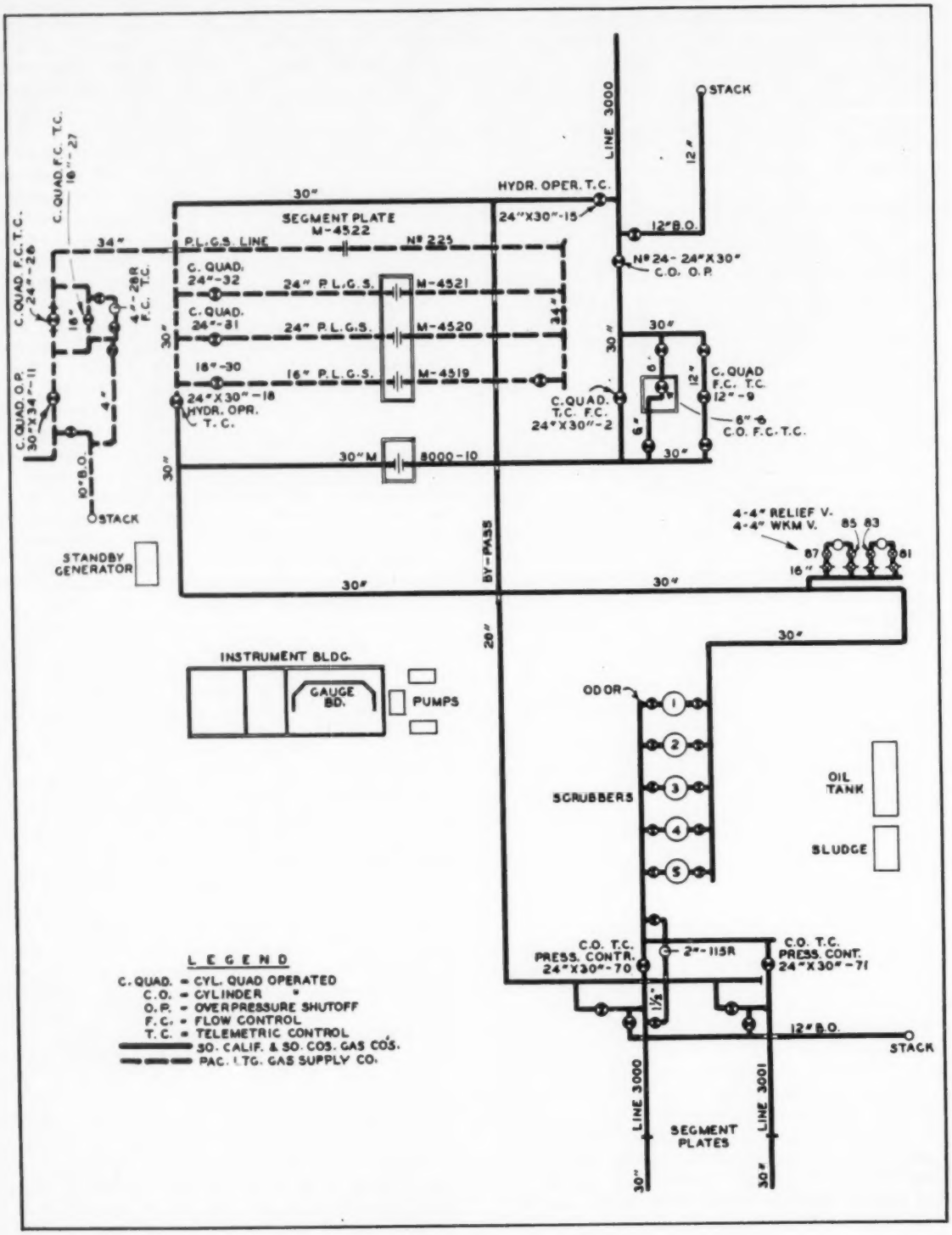


Fig. 2. Quigley station flow diagram.

to throttle to maintain a maximum pressure of 475 psig in the central portion of the station. Volume through the station decreases proportionately. This change from flow to pressure control takes place very smoothly and with little or no effect on the rest of the station operations. The transition in the opposite direction, i.e., to flow control again when the downstream demand increases to a point where the station pressure is reduced to below 475 psig, takes place just as smoothly.

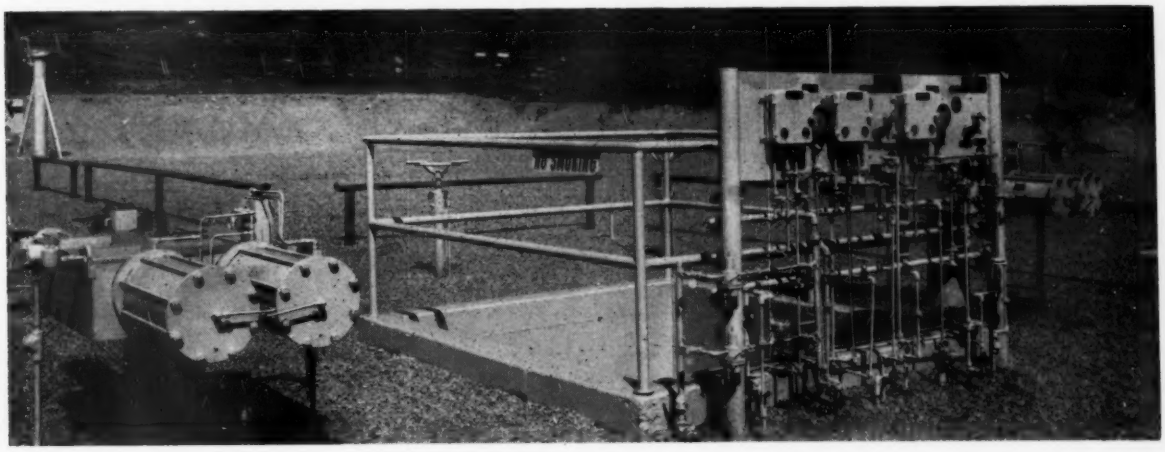
If the demand exceeds the capacity of the 6-in. and 12-in. valves, the dispatcher at Newhall can open the 24-in. x 30-in. valve a selected percentage of its travel to partially by-pass the 6- and 12-in. valves. A Metameter transmitter at Newhall has a scale marked to indicate percentage opening of the valve. The dispatcher sets a pointer to the desired degree of opening of the valve. A Metameter receiver at Quigley positions a Metavane pneumatic transmitter to put out a 3-15 psi signal to the positioner on the 24-in. x 30-in. valve. The valve opens to a position corresponding to the value of the signal selected, and stops. This equipment only positions the 24-in. x 30-in. valve; it has no automatic control function. The 6-in and 12-in. valves continue to receive the signal from the flow controller and throttle as required. Limit switches mounted on the valve cause signal lamps in the graphic panel at Newhall to light. These indicate whether the valve is closed, or open either part or all the way.

The 24-in. x 30-in. valve is also equipped with two over-ride devices. The first prevents the valve from opening if the upstream pressure exceeds 475 psig. It consists of a snap-acting Fisher Wizard controller which senses station pressure immediately upstream from the 24-in. x 30-in. valve. At the set pressure of 475 psig, the output of the controller falls to 0 psig. A Moore Model 61-F relay in the signal line to the valve positioner selects this as the lower of the two incoming signals. With no pressure input to the 24-in. x 30-in. valve positioner, the valve either remains closed or closes whenever the pressure upstream from it exceeds 475 psig. The second over-ride prevents the valve from opening beyond the point where the resulting flow will cause the differential across the 30-in. orifice meter to exceed 100-in. w.c. This is accomplished by means of a Foxboro 0-100-in. w.c. D/P cell connected to the 30-in. orifice meter fitting. The 3-15 psig output signal from the D/P cell is fed to a Foxboro Model 40 differential controller with a narrow proportional band. When the differential across the 30-in. fitting approaches 100-in. w.c., the output of the controller drops toward 3 psig. This signal, in turn, is fed to another Moore low selector relay in the control line to the valve positioner. When it falls below that being sent out by the Metavane transmitter the relay passes it, as the lower of the two incoming signals, to the positioner, causing the 24-in. x 30-in. valve to throttle to keep the differential measured by the 30-in. orifice meter below 100-in. w.c.

The incoming gas then passes through the single 30-in. orifice meter which measures the entire throughput of the Needles line. The tube and fitting were manufactured by the Daniel Orifice Meter Co., Los Angeles, Calif. The fitting is welded to both the upstream and downstream sections of the orifice meter tube. From the meter, the gas passes through a mixing loop, where it is joined by gas received from the PLGS 34-in. Coles Levee line. It then passes the station relief valve manifold and on into the upstream header supplying the battery of five Peerless Scrubospheres. The scrubbers discharge into a header which leads to the manifold feeding the two 30-in. pipelines which carry the gas to the Los Angeles Basin area. At the upstream end of the scrubber header, an odorizer injects the proper amount of "stinkum" to condition the gas received from the Coles Levee line. (Gas in the Needles line is odorized at Needles.) The relief valves, scrubbers, and odorizer are described in more detail later in the text.

In each of the outgoing 30-in. pipelines immediately downstream from the discharge manifold is a 24-in. x 30-in. valve. These valves are equipped with Nordstrom (Rockwell) cast steel cylinders for modulating

Fig. 3. Components of first stage of regulation. Shown are the local control panel and actuators for 24-in. x 30-in. and 12-in. valves. The 6-in. valve is in vault.



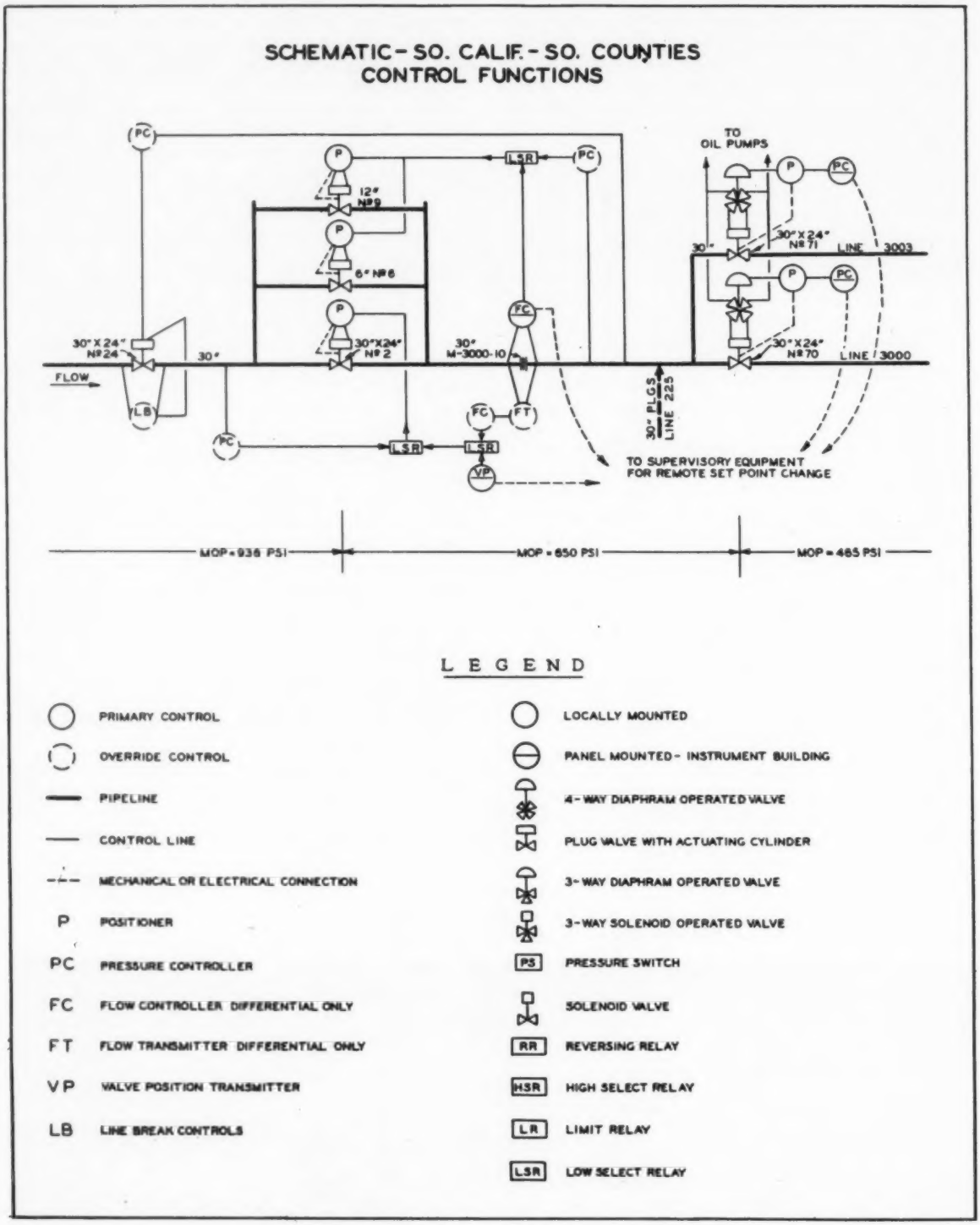


Fig. 4. Schematic diagram of Southern California and Southern Counties' control functions at Quigley station.

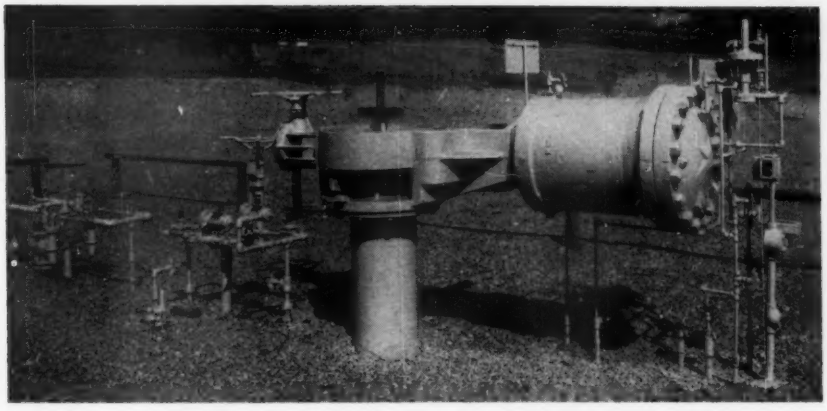
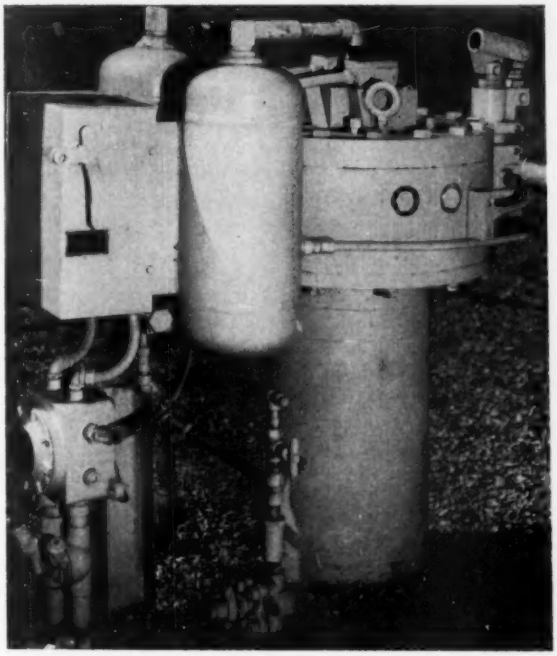


Fig. 5 (left). Valve extension and actuator for mainline station inlet valve. The two-stage regulator assembly which supplies gas for cylinder operators, controllers, positioners, and gas-oil pumps is also shown. (Buried valve is No. 24, 24-in.x30-in. on Needles line.)

Fig. 6 (below). One of two vane-type actuators. Shown are oil reservoirs, hand pump, gas supply line, and electric conduit to solenoid valves.

pressure control of the gas delivered to the Basin area. They also have auxiliary handwheel operating mechanisms for manual operation. Pressure control is achieved by means of remotely positioned Bristol free vane controllers, one for each pipeline. The 3-15 psig output signal from each controller is fed to a Moore valve positioner mounted on the 24-in. x 30-in. valve. A mechanical linkage converts the rotary motion of the valve plug to the straight line valve travel indication required by the positioner. The output signal from the positioner strokes a Mason-Neilan diaphragm-operated four-way valve to direct pressurized oil to either end of the cylinder operator, and allow oil to drain from the other. The four-way valve is adjusted so that a 9 psig signal puts it in a neutral position; i.e., no oil output. As the signal changes from the 9 psig null point, oil is directed to one end of the cylinder (and bled off the other) to throttle the plug valve sufficiently to maintain the desired pressure. Oil pressure is provided by a pair of Ledeen gas-oil pumps, one working and one stand-by. Gas is supplied to the pumps at 80 psig. Oil, drawn from an accumulating tank, is delivered to the valve operating cylinders at about 160 psig. Segmental orifice plates were installed in each of the outgoing pipelines to provide the required differential if it is ever necessary to install separate flow control for the individual lines.



• Odorizer

Gas transported in the Needles pipeline is odorized at the Needles compressor station. Gas received from the PLGS 34-in. Coles Levee line, however, is unodorized. Odorizing equipment, therefore, was installed at Quigley station to condition this gas. The equipment operates in the following manner:

An American Meter Co. double integrating orifice meter gauge, located in the instrument room, is connected across a segmental orifice plate in the incoming 34-in. line. The integrating mechanism causes a disc in the gauge case to rotate at a speed proportional to the rate of flow of gas. Magnets mounted on the rotating disc operate a Mercoid switch, sending intermittent pulses to a timer mechanism. The timer energizes the electric motor of a Lapp Pulsafeeder pump (Model CPS-2) for a set period, injecting a slug of Calodorant "C" into the upstream end of the scrubber discharge manifold. Volume of the odorant slug is varied by manually adjusting the pump stroke.

A remotely operated switch enables the dispatcher at Newhall to stop the operation of the odorizer in the event that odorized Needles gas, previously "packed" into the Coles Levee line, is being withdrawn again from it.

Odorant is injected at the rate of approximately 0.75 lb per MMcf. A small storage tank supplies odorant to the suction side of the Pulsafeeder pump. The storage tank is filled directly from the vendor's drums by means of a gas operated Fast-Flow Model 225-761 drum pump. Flexible hoses are used to connect the drum pump to the storage tank, and to supply gas to the pump. A charcoal filter is provided to "de-odorize" gas vented from the storage tank.

Fig. 7. Five Type S-72 Peerless Scrubospheres outline themselves against a cloudless southern California sky. Each unit can handle 6.5 MMcfh at 500 psig.

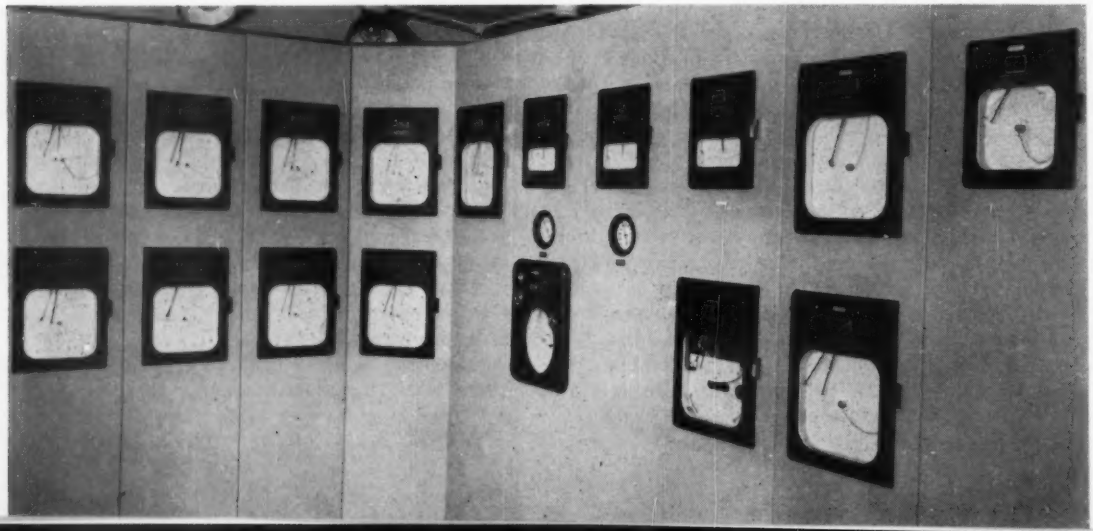
A sight glass in the injection line is used to determine the odorization rate.

• Valves and actuators

All of the major valves at Quigley station are Rockwell-Nordstrom steel Hypreseal plug valves. These are equipped with an interesting variety of operating devices. The function of each valve determined, in part, the type of operating device selected for it. Valves which are used infrequently, such as regulator block valves, scrubber isolating valves, by-pass and blowdown valves have conventional handwheel operated gear actuators. The one locally controlled automatic open-close valve has a Nordstrom cylinder operator, using gas as the operating medium. This valve also has an auxiliary handwheel actuating mechanism. (*See Fig. 5.*) Two remotely operated open-close valves are equipped with Shafer vane-type actuators, using oil as the operating medium. (*See Fig. 6.*) Power for moving the oil is provided by gas at station pressure. Flow of gas is controlled by solenoid valves which in turn are remotely activated by the gas dispatcher at Newhall station through the supervisory control loop. These valves are also equipped with a hand operated oil pump for manually stroking the valves.

As previously described, two of the three valves in the first stage of regulation have Ledeen Quad actuators. These use gas as the operating medium in two of the cylinders, with oil in the remaining two cylinders for hydraulic damping. The oil cylinders also provide a means of manually operating the valve by using a small integral hand oil pump. The third valve has a Ledeen tandem actuator which operates in the same manner.

Fig. 8. Instrument panel at Quigley. Official orifice meter gauges (PLGS Co.) are on left. In center are an integrating orifice meter gauge, telemeter transmitters, and differential controller for Coles Levee line. To the right are the official meters for the Needles line.



The two pressure control valves in the outlet piping from the station each have Nordstrom cast steel cylinder operators. The function of these has also been previously described. These valves use oil as the operating medium. Oil pressure is maintained by Ledeen gas-oil pumps.

From the above range of representation, it can be seen that company engineers are open minded about power valve actuators. Some have been used many times. All are doing the job assigned to them; none appear to be the perfect package for a control application.

• Scrubbers

Five Type S-72 Peerless Scrubospheres are currently in service at Quigley to remove entrained dust and liquids from the incoming gases. Each of these Scrubospheres has a capacity of 6.5 MMcf per hr at 500 psig (*see Fig. 7*).

These scrubbers employ a unique principle for removing foreign material from the gas stream. A motor-driven rotating flat contactor disc, made up of layers of wire mesh totaling about 1.5 in. in thickness, and the same diameter as the sphere, is oriented normal to the flowing gas stream and roughly 45 deg to the horizontal. As the disc rotates at about 0.5 rpm, the lower edge of the disc dips into a supply of oil maintained at a fixed level in the lower portion of the sphere. As the disc rotates, oil flows back through the closely spaced wire mesh, washing off any dust adhering to the wetted surfaces. Liquids entering the scrubber either fall directly into the oil reservoir or end up there by draining off the contactor disc. A mist extractor downstream from the disc removes any oil blown off the back side of the disc and drains it back to the reservoir. Heavy solids collect in a sump at the bottom of the sphere and are drained periodically through a pipe manifold to a dirty oil settling tank. Make-up oil is pumped from the settling tank, at station pressure, back into the scrubber oil reservoir.

Up to the present time, this oil transfer has been manually controlled. Now, however, lubricating oil from the compressor station at Needles, after about 21 months of operation, is being picked up by the scrubbers at Quigley station. As this is written, preparations are being made to install Kim-Ray floatless liquid level controllers and motor valves on the scrubbers to automatically drain any excess oil accumulation in the reservoir.

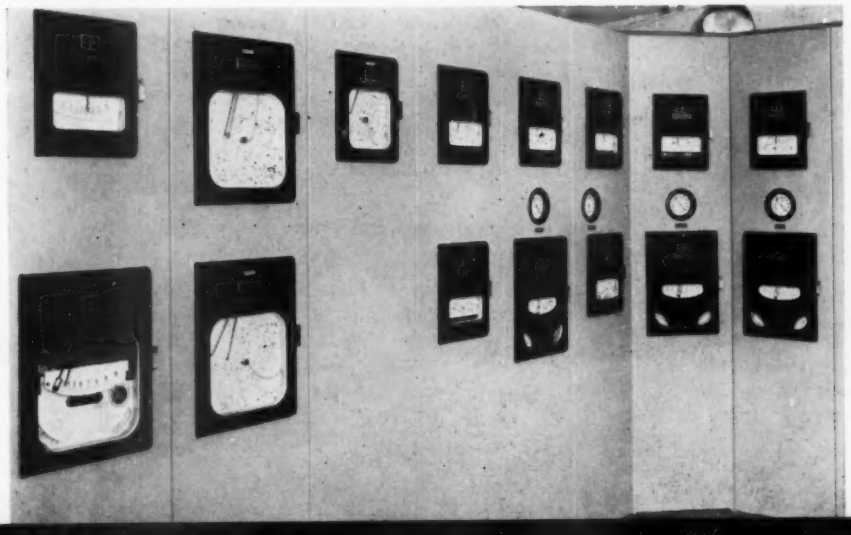
• Building

A concrete-block building on a concrete slab, 54 ft long and 15 ft wide, houses the gauge board, supervisory equipment and relay cabinets, and the gas calorimeters and gravitometers in three separate rooms.

The instrument room is 25 ft long and contains a "U" shaped steel panel board totaling 28 ft in length. (*See Fig. 8.*) This panel contains the official orifice meter gauges for measurement of both the Needles line gas and gas into and out of the PLGS Coles Levee line. It also contains pressure and differential telemeter transmitters for the remote orifice-meter gauge recording receivers at Newhall station, as well as telemeter transmitters for up and downstream pressure recording receivers for both PLGS and Southern California-Southern Counties lines at Newhall station.

Miscellaneous gauges mounted in the panel include the integrating orifice meter gauge for the odorizer, recording temperature gauges for both pipelines, indicating gauges for upstream, downstream and station pressures for both systems. The instrument room is defined as a hazardous location by State Electrical Safety Orders. All wiring and conduit, therefore, including lighting fixtures, are explosion-proof. Gauge lines from the four orifice meter fittings come in just under the eaves of the building and are distributed on brackets along the top of the gauge board. Pressure and control lines enter and leave the building through a shallow pit in the floor near the center of the board. An instrument supply header lies along the bottom of the gauge board and two vent headers

Here is the other half of the instrument panel at Quigley showing telemeter transmitters, with Needles line differential controller and pressure controllers on the right.



lie along the top of the board. One of the vent headers is used to exhaust gas from cases having a normal bleed in them, such as the various controllers. The other header vents cases and instruments that do not normally have gas in them, such as the telemeter transmitters, orifice meter gauges, and upper diaphragm chamber of the instrument supply regulators.

A thermostatically actuated exhaust fan is provided for the instrument room, as well as conventional ceiling ventilators. An explosion-proof telephone is mounted above a desk-storage cabinet in one corner of the instrument room. A relay operates signal horns on either side of the building whenever the telephone rings.

The electrical equipment room is adjacent to the instrument room. It is 10.5 ft long and contains the remote-end supervisory cabinet, the power relay cabinet, the various cycle timers, the station master power and lighting breaker panel and the automatic line transfer panel for the standby generator. Because there was some space left on one wall, it also contains the tools used for "policing" the station, shovels, rakes, brooms, etc. Recently, this turned out to be a fortunate circumstance for one of the men checking some of the electrical equipment. As he turned to leave the room he found the doorstep occupied by a sizable rattlesnake, comfortably basking in the morning sun. With the aid of one of the convenient shovels, our man was able to make his escape and go about his business, shaken but unbitten. Because of the partition separating this room from the instrument room, and the fact that all conduits entering or leaving the room are sealed, it was possible to use conventional, non-explosion-proof electrical equipment in this area.

The third room is 16.0 ft long and houses two Ranarex recording gravitometers and two Cutler-Hammer recording gas calorimeters, one of each for each of the two sources of incoming gas. A manifold permits connecting any of the instruments to either of the two gas sources. There is also a provision for connecting cylinders of reference gas to any of the instruments for testing and calibrating purposes and a connection for taking readings from field sample containers. The gravitometers are here to provide coefficient data for the orifice meter volume computations. The calorimeters are here because Southern California-Southern Counties' rates are a function of the heating value of the gas, within prescribed limits and subject to a number of well-defined conditions. Since Quigley station is a major port of entry for the Los Angeles Basin area, these instruments determine the heating value of a large share of the gas entering the area.

In order to comply with California Public Utilities Commission requirements, the water bath which controls the ambient temperature of the gas and air entering the calorimeters is maintained at 74 deg F, plus or minus 2 deg F. This room, therefore (and it is the only room of the three), is equipped with both heating and cooling facilities. In an area where air temperatures range from 20 to 110 deg F, this is somewhat of a problem. In any event, this room is usually the most comfortable spot in the area.

• Relief valves

In addition to the various "overrides" and over-pressure protection devices, the station is also equipped with a "last resort" relief valve set-up designed to vent to atmosphere any excessive pressure build-up in the station. (*Fig. 9.*) This set-up is connected to the mixing loop in the "working" or "middle pressure" portion of the station. Instead of the conventional poppet-type relief valve, this set-up consists of a bank of four 4-in. Fisher double ported diaphragm-operated motor valves connected to a manifold on the upstream side, and discharging into a pair of 12-in. blow-off stacks (two to a stack). Each of the four Fisher motor valves is controlled by a separate Wizard pilot. The pilots are set to open the valves in sequence at 5 psig intervals, with the first set at 625 psig. The pilots provide throttling action of the motor valves, which means that only the necessary amount of relief capacity is brought into service. Full-opening W-K-M gate valves were installed between the manifold and the motor valves to permit removal of the Fishers for inspection or maintenance.

After the station had been in service for a while, it became evident another type of pressure-relieving device was necessary. Under certain operating conditions, such as "packing" the Needles line upstream from the station in preparation for the morning peak load, the downstream discharge valves are closed. When this happens, the first stage of regulation shuts off when the station reaches the limiting set pressure of the first stage, i.e., 475 psig. Slow leakage through this stage, however, sometimes caused the station pressure to build up to the set point of the over-pressure controller on the main inlet valve, causing it to close. Since there are no position-indicating lights for this valve on the graphic panel at Newhall, the fact that the valve had closed was often not discovered until the dispatcher attempted to pull gas through the station for his morning load. Because the main inlet valve must be manually re-opened, this situation usually resulted in a scramble for Quigley to get the station on-stream again.

To prevent all of this from happening, a 2-in. Grove Flexflo valve was installed in a by-pass around one of the discharge valves to relieve excess station pressure into the downstream system. Control of this relief function is very simple. A small buried tank is pressurized to a value slightly higher than the normal station operating pressure, but below the set point of the over-pressure controller on the main inlet valve. This pressure is applied to the outside of the rubber sleeve in the Flexflo. If the station pressure builds up sufficiently to overcome the sleeve tension plus the loading pressure, the Flexflo opens to relieve the excess.

• Standby power supply

Electrical power for Quigley station is supplied by the local utility. Because remote control and supervision of operations at this station are largely dependent on the functioning of electrical equipment, however, a 25-KW Onan gas-engine driven standby generator was installed. An automatic line transfer

device starts the generator and transfers the load to it in the event of outside power failure. This same device transfers the load back to the utility service when power is restored, and shuts off the generator.

• Typical control operation

It might be interesting to follow through a typical control function, as executed by the dispatcher at Newhall. Let's pick one of the more complex ones, such as taking gas from the Coles Levee line at a given rate. Assume that the line has been out of service for a while, overnight perhaps, and that the dispatcher has received an order from the coordinator in Los Angeles to take gas at a rate of 2 MMcf per hr. At this point, the valve separating the PLGS meter manifold from the balance of the station is closed. The flow control set-up at the inlet to the PLGS meter manifold is also shut off, because an interlocking arrangement causes it to close whenever the valve separating the PLGS portion from the balance of the station is closed.

Undoubtedly, leakage through the three valves in the flow control set-up has built up a pressure in the meter manifold about equal to that in the Coles Levee line. The first step, then, is to open the valve separating the two sections of the station to equalize the two pressures. Before he can do this, however, the dispatcher must set the Coles Levee line controller for zero flow, to prevent a rush of gas into the station when the isolating valve is opened. The isolating valve is interlocked with the controller so that it will not open unless he does this, and an alarm will sound if he attempts to open the isolating valve without setting the controller for zero flow. Another interlock prevents the isolating valve from opening if the valve separating the PLGS meter manifold from the Needles line is open. This is to prevent accidental by-passing of the inlet control set-up in the Southern California-Southern Counties portion of the station.

After setting the Coles Levee controller for zero flow, the dispatcher is ready to open the isolating valve. For each operational change which can be made from Newhall, a set of switches and lights is provided on the graphic panel. These switches and lights are located adjacent to the representative symbol on the panel. In the case of the isolating valve, there is a red light to indicate that the valve is closed, a white light, and a green light to indicate that the valve is open. There is a toggle switch below this horizontal row of lights to select the open or closed position, and below it a telephone-type toggle switch, mounted vertically, to initiate operation of the valve.

To open the isolating valve, the dispatcher moves the selector switch to the "open" position. The white light is now lit along with the red one. The dispatcher then operates the initiate switch. To assure that the dispatcher closes the initiate switch for a sufficient length of time for the complete transmission of the coded tone signal to Quigley, another white "signal" light is provided at the top of the graphic panel. When this light comes on, the dispatcher releases the initiating switch. The valve is now opening. When it is completely open, the red and white lights go out and the green light comes on, signifying to the dispatcher that the valve operation is complete.

At this point the dispatcher must set the flow controller for the desired rate. Because of the wide control range designed into the PLGS portion of the station (0.5 MMcf per hr to 27 MMcf per hr) the dispatcher must choose one of the four differential pressure range and meter combinations available to him. These are 20-0-20 in. or 100-0-100 in. w.c. differential pressure indications from either the 16-in. orifice meter fitting or the segment plate in the 34-in. pipeline leading to the meter manifold. The indication he selects is telemetered to the single receiver on the gauge board at Newhall, and is also passed to the local volume controller at Quigley.

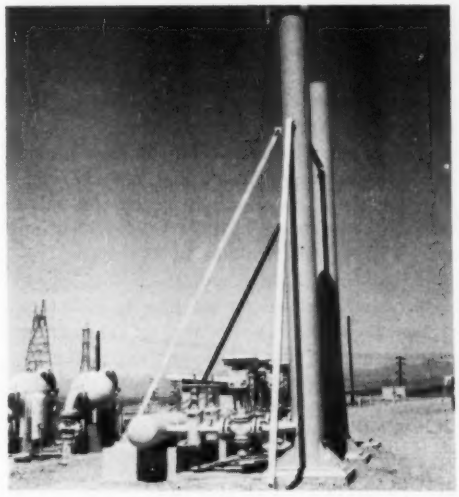


Fig. 9. Pressure relief installation, showing motor valve bank and 12-in. blow-off stacks.

The differential pressure receiver at Newhall has a 10-0-10 square root chart and a separate 0-10 square root scale with an adjustable index for hand setting. When the flow of gas is from the Coles Levee line into Quigley station, the pen records on the outer half of the chart; when the flow is from Quigley, i.e., the Needles line to the PLGS line, the pen records on the inner half of the chart. The setting of the indicating pointer on the 0-10 scale is the same regardless of the direction of flow of the gas.

After the dispatcher has determined the proper meter, range and controller setting for the desired rate, he sets the controller index pointer to the desired value. Meter and range selection is accomplished by means of selector and initiate switches on the graphic panel adjacent to the respective representations of the facilities similar to those for valve operations. Amber pilot lights indicate which of the meters and ranges is being used.

The dispatcher then moves the meter selector switch to the desired position and does the same with the range selector switch. He is now ready to cause the remote equipment at Quigley station to conform to the settings he has selected. To do this, he first pushes

the "initiate" button in the differential receiver case. This not only starts the Metaset positioning elements in the receiver case and in the remote controller at Quigley, but also actuates a relay which in turn closes a solenoid valve in the output line from the controller to the valve positioner, thus preventing the outgoing signal from reaching the positioner. A blue pilot light in the graphic panel at the control valve location lights and stays on during the controller positioning cycle. When it goes out, the dispatcher then operates the initiate switches for the meter and range selection functions. For both initiate button and switch operations, he must wait in each case for the white signal light to come on at the top of the graphic panel before releasing each switch or button.

Operation of the meter and range initiating switches causes relays at Quigley to energize solenoid valves on small piston-operated three-way valves (Ledeen Model POR). These pass the 3-15 psig output signal from the selected pneumatic differential transmitter to the flow controller and also to the telemeter transmitter for transmission to Newhall. These operations, after both have been completed, also cause the solenoid in the output line from the controller to open allowing the signal to reach the valve positioner and the controller to take over operation of the valves. The valves respond to the signal received and open to pass the desired flow.

The solenoid valve in the control line is a safety feature to prevent erratic operation of the valve set-up during meter and/or range switching operations. The control valves remain in the same position until all switching operations have been completed. Since any change in controller setting "locks-in" the signal to the positioner, and operation of both meter and range initiating switches is required to "unlock" the signal, the dispatcher must go through the same ritual every time he makes a change. In other words, each time he changes the flow rate, he must either change or confirm both meter and range selections in addition to changing the controller set point.

• Miscellany

It should be mentioned that it is not possible to control the rate taken from the Needles line with the first stage and at the same time control the pressure into both of the outgoing lines. Pressure can be controlled on one of the outgoing lines, but the other must be able to take any gas in excess of that required to maintain a set pressure in the first line. When operating on a volume control basis, the pressure controller for one or both of the outgoing lines is usually set to the maximum allowable for the downstream system, i.e., 465 psig. Under these conditions, at least one of the downstream valves is wide open, and the central portion of the station is equalized with the downstream system.

If it is desired to limit both lines to less than their allowable maximum pressures, say at 400 psig, the flow control stage will pass gas at the set rate until this limiting pressure is reached. At this point, the downstream pressure controllers take over to hold the pressure at 400 psig, and the pressure override on the flow control stage takes over to hold the station pressure at 475 psig. When controlling downstream pressures only without regard for through-put rate, both pressure controllers can be set at any desired value. The inlet stage, through the pressure override, then simply functions to limit the station pressure to 475 psig.

One of the more persistent problems connected with the operation of Quigley station has been the interaction between the three control set-ups. That is, flow control of the Coles Levee and Needles lines and pressure control of the outgoing gas. Any instability or hunting in any one of the control groups affects one or both of the others. Considerable experimenting had to be done to determine the most effective settings for proportional band and derivative units in each of the individual controllers to make each group as stable as possible in its own operation. The most effective deterrent to inter-action, and to individual instability, was found to be speed control of the valves themselves. All the control valves are set to operate at the minimum speed possible consistent with satisfactory operation of that particular control group.

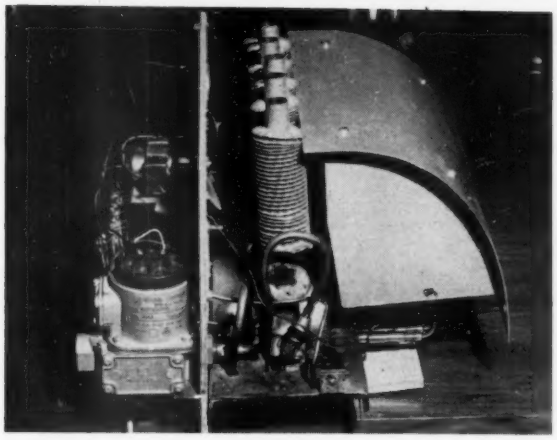
An interesting aspect of the design and operation of Quigley station is the fact that, in spite of the large quantity of electronic equipment involved in the control and supervision, complete loss of electrical power, whether normal or standby, in no way affects the basic control functions of the station. The dispatcher at Newhall would lose his telemetered indications of conditions at the station, and would not be able to change controller settings or valve positions, but the operation of the station itself would continue exactly the same as if no loss of power had occurred. The two gas conditioning devices would be affected, however. The odorizing unit for gas received from the PLGS Coles Levee line would not work, and the electric motor driven rotating discs in the scrubbers would stop.

Even though quite an assortment of oscillators, audio amplifiers, timers, receivers, relays, and telemeter drive motors are required to change the position of a controller at Quigley station, or to energize a solenoid valve to open or close one of the station valves, all of this equipment is dormant except during the actual positioning operation. Once set, the operation of the local control loop, including the controller itself, the valve positioner, and valve operator, is entirely pneumatic. Gas provides the motive power to operate the control valves, whether by means of the Ledeen Quad—Foxboro Power Positioning combination, or the Ledeen gas-oil pumps used with the Nordstrom hydraulic cylinders.

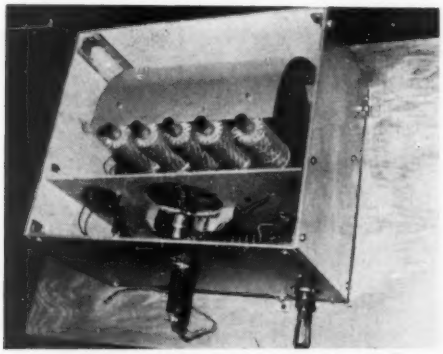
Pressure limiting and relief devices are all pneumatically actuated. Solenoid valves used to control flow of gas to the open-close valve operators, such as the Shafers; or to meter and range selectors in the PLGS portion of the station piping, are momentarily energized, i.e., only long enough to complete the desired operation. ■

Part 2 begins on page 103

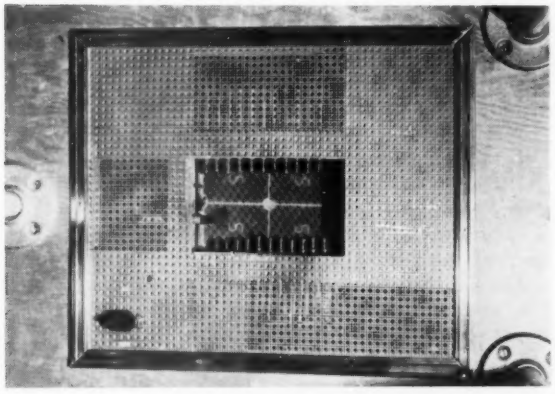
New radiant heater developed



Gas inlet end of heater is shown with side view of finned-type heat exchangers which were cut from one 5-ft tube to lengths of 5½ in. each.



Internal arrangement of heater, looking into it from above installation point, shows cover removed and compartment housing heat exchange surface, sensing element of temperature cut-out, and hood directing air from fan back into room, at top. Small compartment serves as circulating air inlet duct and contains gas valve, fan motor, and body of excess temperature cut-out switch.



Installed in ceiling, experimental gas-fueled bathroom heater looks like this with only radiant burner and ornamental screen surrounding it visible. Screen dimensions are 13 in. x 15⅝ in. Shown are the 24 base thermocouples. They are connected in series to drive a Calrod motor with shop-made fan blade mounted on motor shaft.

A NEW concept in gas-fueled bathroom heaters has been designed and successfully demonstrated by Lone Star Gas Co. research and development engineers.

The unit combines the use of a recently developed radiant type burner for its heat source and a series of 24 small thermocouples to generate thermoelectric energy. The later power a built-in air handling fan to increase efficiency of the unit by recovering a portion of the exhaust heat. The automatic valve controls are also operated by thermoelectricity.

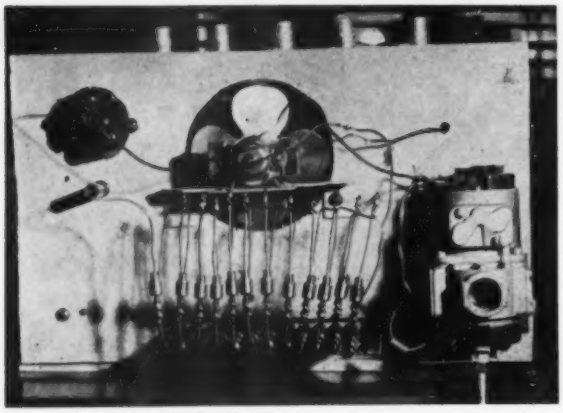
Representing a distinct departure from conventional bathroom heaters, the unit is designed for ceiling installation, thus freeing congested wall areas.

The single-utility heater operates entirely on natural gas or L. P. gas and demonstrates the principle recently announced by the American Gas Association following successful tests in the use of thermoelectricity to drive an air handling fan. The AGA explained that the electric generation by heat at the point of use "opens entirely new design concepts for gas appliances, promising even greater convenience and comfort."

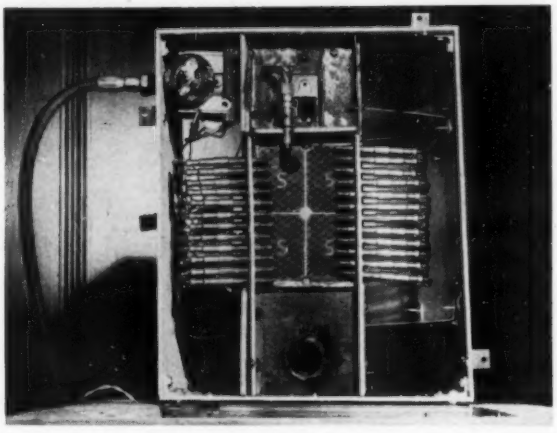
"In such appliances," the announcement continued, "electricity, mechanical motion and heat all would come from one energy source, gas."

The thermoelectric source used in the Lone Star bathroom heater is of the same type announced by the Atomic Energy Commission last January for use in space satellites using an atomic fuel known as Polonium 210. The AEC report described the nuclear auxiliary power generating device, known as "Snap III," as "a significant breakthrough because of its high efficiency, generating stamina, and absence of moving parts." The same improved thermocouples are used in the Lone Star unit with natural gas instead of atomic fuel used to heat the thermocouples.

The small, radiant type burner in the experimental heater supplies a high concentration of infra-red heat. Its high efficiency and low-cost operation have made it particularly adaptable to many types of commercial



Circulating air inlet side of heater shows cold air junctions of one series of thermocouples, fan motors, and gas valve (lower right). Body of excess temperature cut-out switch is shown upper left.



Lower side of unit before installation and attachment to ceiling screen. Two banks of power thermocouples can be seen on either side of radiant burner. Entrance to exhaust system can be seen in lower center.

and industrial use such as quickly defrosting airplanes, lengthening the profit season for outdoor restaurants, heating outdoor construction areas and drying grain crops for storage.

Its versatility makes it ideal for ceiling installation in heating large or small bathrooms because of its instant warming action despite relatively low ambient or surrounding air temperatures.

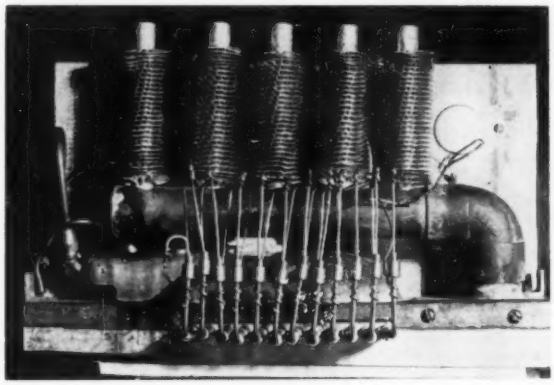
The radiant type burner in itself is a highly efficient heat source. More than 50 per cent of the heat produced is reflected directly into the area to be heated. The burner was conceived and developed by Guenther Schwank, a German designer of gas appliances.

Lone Star's experimental unit adds to this efficiency through the air handling unit which recovers an additional 25 per cent of the heat which might otherwise be lost. The stack temperature is minimized by this heat recovery system, being reduced from 1000 deg F at the burner outlet to 228 deg at the stack outlet. The fan circulates incoming cold air over the cold junctions of one set of thermocouples and blows it over a series of five small finned-tube heat exchangers connected to the horizontal exhaust header, for the additional heat recovery.

The burner has a constant-burning gas pilot with the main valve controlled by means of a simple wall switch. Wiring to this control point is low voltage, low amperage and offers no electrical hazards, engineers point out, due to use of self-generated thermoelectricity.

The entire unit is contained in a two-compartment box with component parts mounted on a common base. When installed in the ceiling, the only portion of the heater visible is the 5½ x 3½-in. burner grid and its surrounding ornamental screen measuring 15⅝ in. by 13 in. The box above the screen is 12 in. wide, 14½ in. long and 8¾ in. deep.

The Schwank burner is rated 4800 Btu per hour input. The burner pilot is match-ignited just once in the autumn by holding the valve handle against



Here is circulating air inlet outlet and exhaust heat exchanger side. Hood which directs air from fan back into room is removed. Heat path is from other side of unit through fins in heat exchangers and down into bathroom.

spring tension until the thermal element becomes hot. This valve provides complete shutoff of both main burner and pilot in the event of pilot failure and permits remote operation of the main gas valve through the on-off switch or thermostat.

Although the experimental unit is not equipped with a radiant heat reflector around the burner, it is suggested that a well-designed reflector would be desirable in a production model.

Cost of the pilot model, although relatively high, does not reflect true cost based on mass production. Retail price of the motor used in the experimental unit is $1.95. The lead telluride thermocouples, of which 24 were used, were $4.50 each but engineers state that these are now available at about $2 each to heater manufacturers. If further improvements in manufacturing could reduce the cost to 50 cents each, the economy factor should become more acceptable to manufacturers and purchasers. ■

GAS UTILITY AND PIPELINE REQUIREMENTS OF STEEL PIPE FOR NEW CONSTRUCTION, MAINTENANCE AND REPAIR, BY SIZE OF PIPE, 1959
(Thousands of tons)

Size of Pipe	Total	New Construction	Maintenance and Repair
Nominal Pipe Size - Inches			
3/4 and less	23.4	21.8	1.6
1	10.3	9.3	1.0
1 1/4	13.2	11.1	2.1
1 1/2	8.9	6.9	2.0
Outside Diameter-Inches			
2 5/8	75.5	70.4	5.1
3 1/2	29.4	25.2	4.2
4 1/2	115.3	102.9	12.4
6 5/8	124.6	114.1	10.5
8 5/8	96.3	89.1	7.2
10 3/4	66.2	63.2	3.0
12 3/4	78.7	73.5	5.2
14	25.1	25.0	0.1
16	84.5	77.8	6.7
18	28.3	27.6	0.7
20	182.7	176.4	6.3
22	2.0	1.9	0.1
24	204.5	204.1	0.4
26	66.7	66.7	a
30	234.4	234.4	a
34	109.5	109.5	a
36	415.9	415.9	a
Other Sizes	8.0	8.0	a
TOTAL	2,003.4	1,934.8	68.6

a. Less than 50 tons.

AGA reports on industry construction

GAS utilities and pipeline companies will spend a record $1,859,000 for construction this year, the AGA estimates. This is 4.9 per cent over the all-time peak of $1,772,000 spent in 1957. The figure exceeds 1958's $1,618,000 by 14.9 per cent.

Summarizing its annual survey of gas industry construction expenditures, AGA's Bureau of Statistics said reports from individual companies show that outlays for plant and facilities expansion will rise steadily to $2,166,000,000 in 1962.

Construction during the years 1959-62 is expected to cost $7.9 billion. This represents a 25.7 per cent increase over the $6.3 billion spent in the previous four-year period.

Extension of transmission systems accounted for the largest share of last year's construction expenditures: $715 million.

Transmission construction is expected to increase to $809 million this year; to $1,025,000,000 in 1962. For the four years ending in 1962, these outlays will total $3.5 billion, up 27.5 per cent from the $2.8 billion spent in 1955-58.

GAS UTILITY AND PIPELINE CONSTRUCTION EXPENDITURES, BY TYPE OF GAS AND TYPE OF FACILITY: 1958-62

(Millions)

Type of Gas and Facility	Actual 1958	Forecast 1959	1960	1961	1962	Total Forecast 1959-1962	Actual Total 1955-1958
Natural Gas - Total	$1,566	$1,806	$1,843	$1,915	$2,094	$7,658	$6,003
Production and Storage	214	205	208	166	177	756	791
Transmission	713	807	773	911	1,022	3,513	2,754
Underground Storage	73	115	118	112	123	468	252
Distribution	497	605	670	650	678	2,603	1,945
General	69	74	74	76	94	318	261
All Other Types of Gas - Total	52	53	55	62	72	242	284
Production and Storage	4	5	4	5	13	27	34
Transmission	2	2	2	4	3	11	11
Distribution	44	43	46	50	52	191	223
General	2	3	3	3	4	13	16
Total Industry - Total	1,618	1,859	1,898	1,977	2,166	7,900	6,287
Production and Storage	218	210	212	171	190	783	825
Transmission	715	809	775	915	1,025	3,524	2,765
Underground Storage	73	115	118	112	123	468	251
Distribution	541	648	716	700	730	2,794	2,168
General	71	77	77	79	98	331	278

AGA expects distribution facilities to cost a record $648 million this year, up 9.3 per cent from the 1957 peak of $593 million. A climb to $730 million is anticipated in 1962. Distributors spent $541 million for construction in '58.

Total distribution expenditures of $2.8 billion for the years 1959-1962 will be 28.9 per cent over the 1955-58 total of $2.2 billion.

Production and storage construction by pipelines and distributors, which cost $291 million last year, will amount to some $325 million in '59. Underground storage will get about $115 million of this. Forecasts indicate that underground storage spending alone will total $468 million during the four years ending in 1962. This is an 86.5 per cent increase over the $251 million spent in 1955-58.

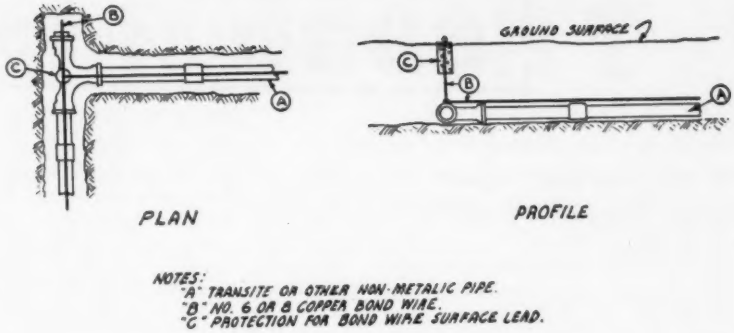
The report also shows that the industry used more than 2 million tons of steel pipe during 1958. Sixteen-inch or larger pipe accounted for 1,334,000 tons, or 66.4 per cent of the total.

AGA's materials consumption data, gathered biennially with the general construction information, shows that steel pipe used in 1958 climbed 38 per cent above the 1956 level.

Total utility plant of the gas industry advanced to a new high of $18.07 billion, up 8.3 per cent from the 1957 level of $16.7 billion. Total assets had increased to $21.4 billion by the end of '58. ■

STEEL AND OTHER METALS USED BY THE GAS UTILITY AND PIPELINE INDUSTRY, 1958-1962

	Actual 1958	Forecast 1959	1960	1961	1962
Steel, Total (000 Tons)	2,008	1,983	2,589	2,324	2,100
Pipe, Total	2,003	1,978	2,582	2,316	2,090
Pipe under 6"	277	316	395	529	586
Pipe 6" - 14"	392	389	478	554	552
Pipe 16" and over	1,334	1,273	1,709	1,233	952
Other Steel	5	5	7	8	10
Cast Iron (000 Tons)	42	45	54	72	83
Copper (Tons)	1,264	1,471	2,084	2,777	3,222
Aluminum (Tons)	42	48	54	67	79



Above: Use of salvage wire to provide means for tracing non-metallic pipeline with conventional electronic pipe finder. Source: U. S. Navy BuDocks Digest. Left: Normal operation of conventional M-Scope for tracing buried pipes and cables.

Locating non-metallic pipe

By GEORGE M. MAC LEOD, Manager, Geophysical Division
Fisher Research Laboratory Inc., Palo Alto, Calif.

LOST piping can be time consuming, costly, and annoying. Metal lines can usually be readily detected and traced with conventional electronic pipe finders. Finding non-metallic lines requires a little more originality. Obviously they cannot be located and traced with standard pipe finders since they depend upon the presence of metal for normal operation.

There are, however, a few techniques to make it possible, at least in some instances, to locate non-metallic lines with a conventional pipe finder. To the uninitiated it would seem that the problem is academic. Why not just consult original drawings and then dig down to the buried line?

Experience has shown that it is rare indeed that underground facilities are located accurately enough on plot plans to enable them to be found without exploratory digging. Once a line has been buried a few years and the original employees lost, transferred or resigned, the exact location of the facility often becomes increasingly vague. The problem is compounded by steady expansion of the area, with the consequent addition in number and complexity of buried services.

Commercial pipe finders are, of course, in effect metal detectors. The presence of metal objects such as pipelines, valves, or manhole covers causes an indication that can be observed both as a buzz in headphones and as a visual meter indication. The secret then is somehow to introduce metal into or immediately adjacent to lost and buried non-metallic line. This can be done in several ways.

Perhaps most common is through the insertion of a sewer snake or clean out rod assembly into the missing line at some known location. The pipe finder transmitter is connected directly to the sewer rod. The rod then becomes a radio transmitting antenna. Location and depth of the extended sewer rod or snake can then be mapped with the pipe finder receiver and with it the pipe. This technique has been used regularly to locate the extensions of non-metallic sewer lines. There is no reason why it cannot be used for other similar application.

A second method is to lay salvage wire in the trench with non-metallic lines when they are installed. The wire should be spliced so that it is continuous throughout. Ends can be brought to surface at services or other convenient locations. Old double-twist telephone wire has been used satisfactorily for this application. In subsequent years the pipefinder can be used to trace out the buried wire and with it the buried non-metallic line.

This method was originally described in detail by the U. S. Navy in their BuDocks Technical Digest as having been used successfully at the large installation at Moffett Field, Calif. The Selinsgrove Water Supply Co. of Selinsgrove, Penna., also reports successful application of this method. ■

GAS · DISTRIBUTION NEWS

U. S.-Canadian report urges broadening market

"Economic forces . . . point in the direction of a continental system of production and marketing" of natural gas. Thus states a report of the Canadian - American Committee released by the National Planning Association in the U. S. and the Private Planning Association in Canada.

"Natural gas today supplies about one quarter of the total energy needs of the U. S. and Canada. . . . By 1970, it may provide as much as one third . . ." notes the report entitled "Natural Gas and Canada-United States Relations." Its author is energy expert John Davis.

The task of transmission companies, says the report, is "not so much one of extending . . . services to large new geographical areas, but of broadening and deepening the energy markets which are already being served." Essential to more effective distribution is a growth in trans-border movements. ". . . Large-scale movements of gas across the International Boundary" have been slowed down by the fact that "natural gas service . . . is almost everywhere under government regulation."

Export sales are contingent upon the approval of various government bodies. "Long-term contracts . . . have to be secured from proven suppliers and established distributors. Disposable surpluses, rights-of-way, and monopolistic franchises are also involved. Political considerations can, and often do, arise at various levels.

"Delays and disappointments under such circumstances appear to be inevitable." The time taken up by lengthy negotiations and discussions ". . . adds substantially to the cost of each project." In addition, when such a highly modified project is finally approved, "the terms and conditions . . . often reduce profitability much below earlier expectations."

The core of the growing question of natural gas in North America is not, therefore, a problem of conservation. Indeed, states the report, potential U. S. and Canadian reserves amount to "many hundreds, if not thousands, of trillions of cubic feet." The problem is to find "a working environment more conducive to trade."

By stressing the "common needs" of both countries rather than points of friction, both countries may realize their aim of "more rapid economic development. Sizable export markets, if they are remunerative and can be guaranteed for a reasonable length of time, can foster various types of industrial activity. The importing country, however, will want assurance that investments made in mainline transmission, distribution, and customer plant and equipment will be employed for several decades. Such a guarantee, indeed, takes precedence over such other considerations as point of entry, load factor, and price."

California standardizes extension practices

California's privately owned utilities have been ordered to standardize their rules and charges for extending facilities to new customers. Ten gas and electric companies are affected by the California PUC ruling.

At present, utilities make varying charges for extensions.

The order bans the offer of free facilities to subdividers as a promotional means of gaining a competitive advantage.

Besides standardizing and clarifying conditions under which gas and electric firms may extend service to new customers, the decision:

1. Establishes a procedure for maintaining a balance between charges and costs for extensions beyond the normal free length of pipeline or electric powerline;
2. Balances the present free extension allowance with revenue and cost to the utility;
3. Permits utilities to modify their rules if needed to compete with publicity owned facilities which are not under PUC regulation.

Measurement course publishes proceedings

Proceedings of the 34th Southwestern Gas Measurement short course have been published by the University of Oklahoma.

The 379-page, slick-paper bulletin includes 85 technical papers and many illustrations.

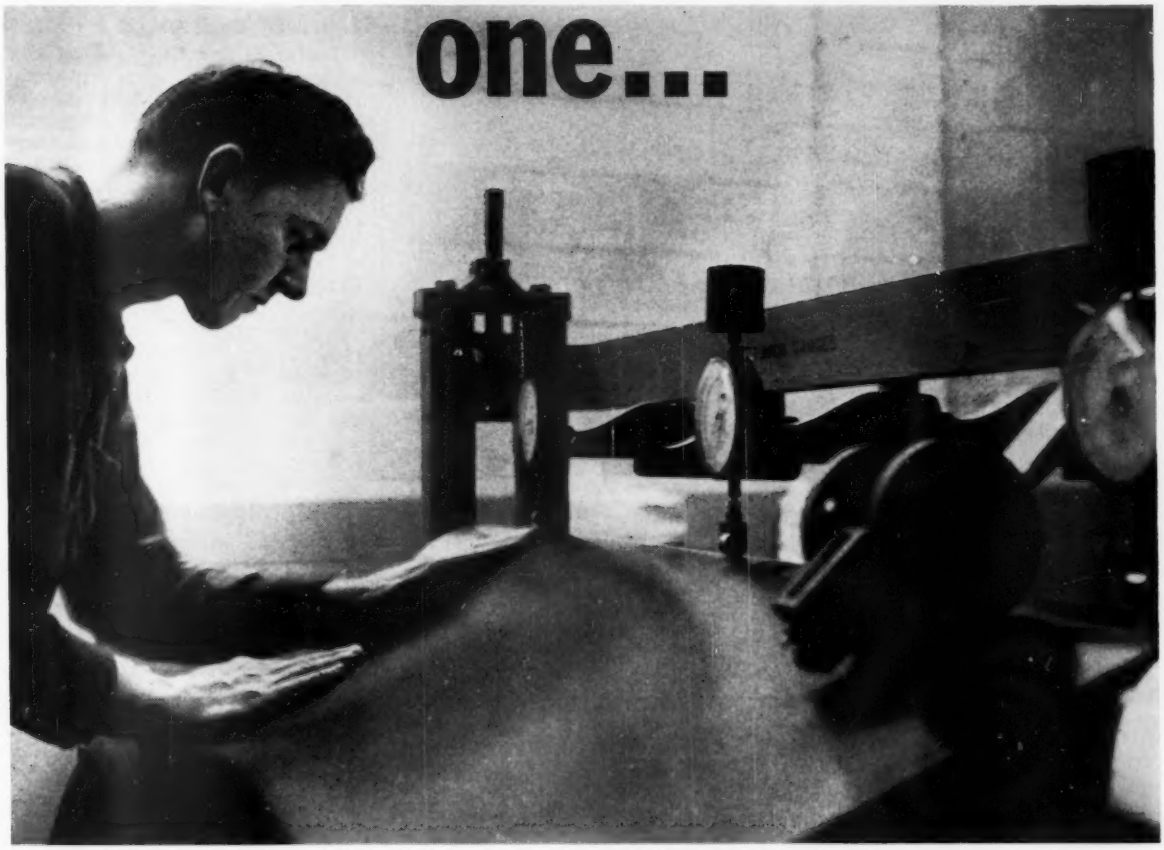
Of the 85 technical papers, 17 are on measurement by orifice; 18 on regulators, controls and related equipment; 12 on measurement by displacement; 5 on gas accounting; and 33 on miscellaneous subjects.

Copies of the bulletin are available from Dr. W. H. Carson, dean of the College of Engineering, University of Oklahoma, Norman. Price is $6 per copy.

Earlville, Ill. became the 280th community served by Northern Illinois Gas Co. Here, natural gas is turned on for the first commercial customer in the city, the Maple Leaf Motel. Shown are Don Fread, NI-Gas serviceman; John J. Carey, district manager; Clyde Jeffries, owner of the motel; Charles F. Henness, vice president-divisions; and H. G. Carr, division manager. Gas light in background was presented to the motel by NI-Gas in honor of the occasion.

If it doesn't pass this one...

Every yard of the coated fabric that goes into a Reeves Vulcan Diaphragm is thoroughly inspected and checked on a Multiple-Head Gauge so sensitive that it indicates the minutest variations in gauge.



you won't find it in a Reeves Vulcan product

Over twenty years ago, Reeves Vulcan began pioneering a tough policy about its diaphragms: every one has to pass *14 rigorous quality-control tests.* Reeves Vulcan has found this the only way of guaranteeing you accurate gas metering and regulation . . . quality control from raw material to finished product.

REEVES GEM VULCAN

RUBBER PRODUCT

Reeves Brothers, Inc., Vulcan Rubber Products Div.
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THE *FINEST* FOR MODERN GAS DISTRIBUTION SERVICE

NORMAC

Malleable Couplings

Normac Insulating Malleable Couplings and fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets.

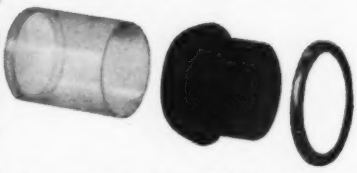
Insulating Couplings AND Fittings

NORTON McMURRAY has specialized for 20 years in the development and production of products solely for the Gas Industry. Whether your plans include modernization, or new, expanded facilities, Normac Gas Distribution Equipment will serve you well.

Malleable Service Ell

The insulating principle depicted above is carried out in all Normac Ells and Tees.

Insulating Gaskets



The Normac insulating principle incorporates an efficient combination of a polyethylene sleeve and a semi-insulating gasket or full rubber gasket and retainer ring.

Brass Fittings

Normac insulating Brass compression end Tees, Ells and all compression end fittings are available with polyethylene inserts and semi-insulating gaskets or full insulating rubber gaskets in ¾", 1" and 1¼" iron pipe sizes.

New CATALOG

Write for your copy . . . it gives complete details and specifications of NORMAC equipment.

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Couplings • Meter Bars • Sleeves • Cocks • Ball Joint Clamps • Service Tees and Ells

MR. PRESIDENT...

You've heard it said many times that "What the gas industry needs is a trade character" . . . a character who can help in the highly competitive battle for the consumer's fuel dollar. Speedy Therm is the only gas character who can't possibly be mistaken for a drop of water, oil, puffed rice or anything else, because he has G-A-S written all over his face. And Speedy brings you a monthly service featuring hundreds of drawings in a wide variety of poses. Hire Speedy Therm *now* to help your company in the battle of fuels.

For More Information, Write

SPEEDY THERM SERVICE COMPANY

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Kansas announces 4th gas pipeline institute

The fourth annual Natural Gas Pipeline Institute is scheduled for Nov. 17-18 at the Southwest Kansas Center in Liberal, Kan.

The two-day course is designed to present the latest practical information on the construction and operation of natural gas pipelines. Its sponsors: State Board of Vocational Education, Southwest Kansas Petroleum Industry, University of Kansas Extension, and the University of Kansas Department of Petroleum Engineering.

Lecturers and their subjects include: "Mill Coating of Pipeline," H. M. McDaniel, assistant manager of sales, pipe division, Republic Steel Corp., Cleveland, Ohio; "Detergent Cleaning of Pipelines," Jack White, manager of pipeline, Panhandle Eastern Pipe Line Co., Kansas City, Mo.; "Current Status of Pipeline System Automation," Frank Williams, senior engineer, office of general superintendent, Colorado Interstate Gas Co., Colorado Springs; "Internal Coating of Pipelines," T. J. Hopkins, sales manager, Tulsa (Okla.) Pipe Coating Inc.; "Mainline River Crossings," M. L. Pentzien of Pentzien Inc., Omaha; and "The Gas Price Mess," Henry D. Ralph, *Oil & Gas Journal*, Tulsa.

Don Seba, supervisor of training and safety for Panhandle Eastern, is institute coordinator.

More heating customers asked by NI-Gas

Northern Illinois Gas Co. asked the Illinois Commerce Commission for permission to authorize space-heating for up to 20,000 single family dwellings.

NI-Gas said a survey showed that not all of the new homes and businesses authorized in May and June to use gas for heating will complete their installations by mid-winter. Thus, there will be a limited quantity of gas available to take care of existing single-family houses applying for gas heat after May 31, 1959.

Upon approval of the new petition, existing homes would have 12 months in which to convert existing heating equipment to natural gas.

When all installations are in, NI-Gas expects to be heating about 400,000 homes in its 20-county service area in northern Illinois.

Asbestos mine uses gas

Northern Ontario Natural Gas Co. Ltd. has a new contract for 1 MMcfd with the Canadian Johns-Manville Co.'s Munro mine. The mine is located near Matheson, Ont.

Munro mine operations include drying the ore and extracting asbestos fiber. Production costs are expected to drop with the use of natural gas. It will be used for plant heating, mine air heating, and drying the asbestos ore.

Houston franchise delayed in Miami

Miami (Fla.) city officials are holding up Houston Corp.'s franchise. They are awaiting a ruling by the state on charges that the Houston Corp. charges little consumers too much for natural gas.

The Junior Chamber of Commerce in the city is challenging rates charged to some 16,000 Miami customers.

Earlier the chamber petitioned the Florida Railroad & Public Utilities Commission for a hearing on rates and rate policies.

The chamber's counsel said it chiefly is concerned about the increase in gas rates to minimum customers. He said that under the old Florida Gas Co., minimum rate was $1.10. This rose to $2 when Houston took over. The new rate was approved by the utilities commission, but without a public hearing.

Counsel Sanford Freed said more than 40 per cent of Miami's natural gas users would fall in the minimum rate class.

Spokesmen for both the city and Houston Corp. agreed that the city has no power to control rates charged by the company, but the city has to approve Houston's operation in issuing a franchise. Houston Corp. has been operating in Miami without a franchise.

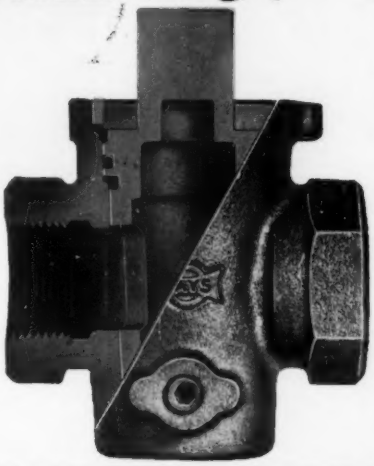
Canadian gas customers continue upswing

At the end of last year, 1,110,960 gas installations were reported in service in Canada. This was a 9.3 per cent increase over the 1,016,079 recorded in 1957.

By the end of 1958 only 35,967 customers were receiving manufactured gas compared with 67,726 in 1957 and 610,096 in 1950.

Sales of natural gas service rose 13.4 per cent during 1958.

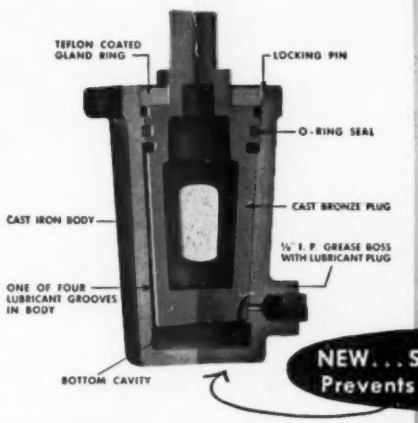
THIS GAS STOP WILL NOT STICK...



- A newly designed HAYS Lubricated and Tamper-Proof Gas Stop . . .
- Stop is completely lubricated at the factory . . .
- Four Grooves in body, and Lubricant Plug provide for pressure re-lubrication . . .
- Locking Pin positively prevents tampering at top of stop . . .
- O-Ring prevents top leakage . . .
- Teflon Coated Gland Ring reduces friction between top of plug and gland ring...

Re-Lubrication does the TRICK

HAYS LUBRICATED TAMPER-PROOF SAFETY GAS STOP*



- Lower initial and turning torque . . .
- Extra grade gray iron body, gas service bronze plug . . .
- Individually tested . . .
- Black or Galvanized, Flat Head or Lockwing Pattern...
- Sizes: ¾", 1", 1¼", 1½", 2", for 125 psi. W. P.

Write for Folder 121 and prices.

*Patent applied for.

NEW... Solid Bottom Construction Prevents Leakage and Tampering

HAYS®

GAS SERVICE PRODUCTS

HAYS MANUFACTURING CO.

ERIE, PA.

There is a Dresser®

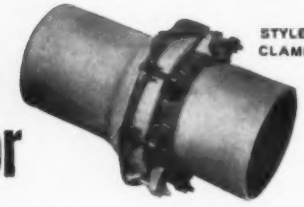
STYLE 38
6-BOLT COUPLING

pipe coupling,

STYLE 90
STREET
TEE

fitting,

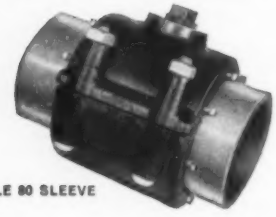
repair clamp,



STYLE 60
CLAMP

or

repair sleeve



STYLE 80 SLEEVE

for every need

Only Dresser
manufactures a complete line.

DRESSER
MANUFACTURING DIVISION

Bradford, Pennsylvania

Among companies ordering the new Univac Solid State computer, shown here in Remington Rand's Los Angeles office, are New Jersey Natural Gas, Tennessee Gas Transmission Co., and Texas Pipeline Transmission.

New "Solid State" computer introduced

Lower cost, reduced maintenance and lower power requirements are some of the advantages of Remington Rand's new "Solid State" electronic computer. The system performs the functions of its large-scale predecessors, but with the mentioned advantages. Also, it takes up far less space and functions in micro-seconds—millionths of a second.

The Solid State is made up of a central processor, a card reader, a read-punch unit up to 10 magnetic tape units, and a high speed printer. This pours out printed results at the rate of 600 lines a minute.

Card reading on both the card reader and the read-punch unit can go on at the same time, as well as simultaneously with punching on the read-punch unit and processing within the central processor. This adds a significant new dimension in speed to the entire data-processing function, according to Remington Rand engineers.

The new computer's "memory" storage capacity of 50,000 characters of information allows the user to perform complete problems in one run, again minimizing actual operating time. It is no longer necessary to work out several parts of a problem, using the results of the first part as input to the second. The solution becomes available with one run through.

New Service-free air conditioner installed

The first installation of a 7.5-ton gas air conditioning unit in the East was made in Public Service Electric & Gas Co.'s central gas plant in New Jersey. According to AGA, sponsor of research contributing to the system's development, the unit is capable of operating at least five cooling seasons without major servicing. It is powered by a long-life natural gas engine developed under AGA's PAR program.

Manufacturer is the Comfortemp division of Comfort Products Inc., Dallas.

The air conditioner is designed to run at least 10,000 hours before overhaul, with only one service call required per cooling season.

Heart of the system is a four-cylinder, four-cycle gas engine designed and built by Continental Motors Corp., Muskegon, Mich.

Many of the long-life design features developed through PAR-supported research are incorporated in the engine powering the Comfortemp system. They include a heavy-duty crank shaft and main bearings, stellite valves and valve seats, a wear-resistant distributor, rotating valve lifters, and advanced manifolding and carburetion. Fuel consumption is rated at about 20 cu ft of gas per ton per hour.

The new air conditioner employs an air-cooled condenser, permitting savings in both water and plumbing costs. Condenser, engine and compressor are housed in an outdoor unit measuring 3 x 3 x 6½ ft. Cabinet interior is acoustically insulated, contributing to the system's low noise level. The entire unit is thermostatically controlled in the one-story Public Service office building cooled by the system.

More News on page 89

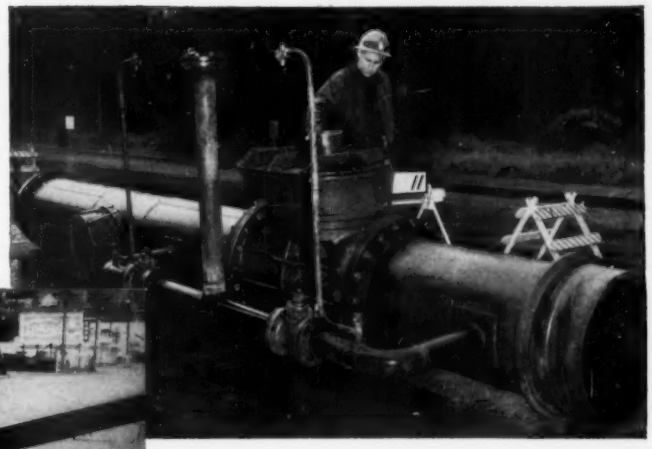
3-STEP VALVE INSTALLATION

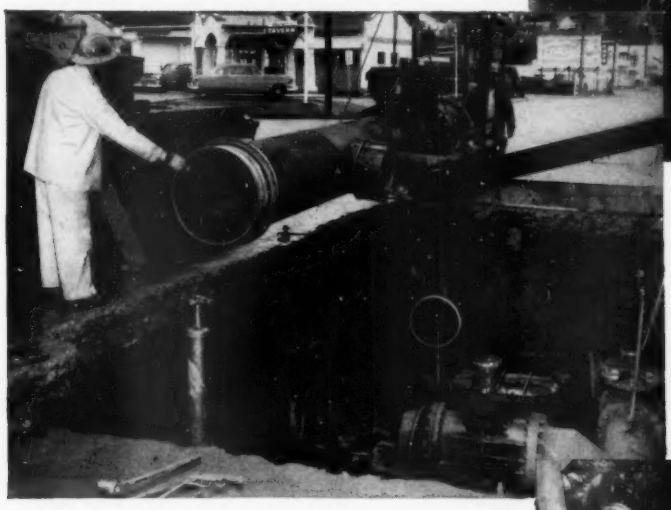
It's Fast and Easy with Dresser® Couplings

TIME is an important factor when a major feeder line shutdown is involved. Northwest Natural Gas Company of Portland, Oregon has developed a 3-step valve installation procedure that saves considerable time and vastly simplifies the whole operation. The sequence of illustrations shows how it is done.

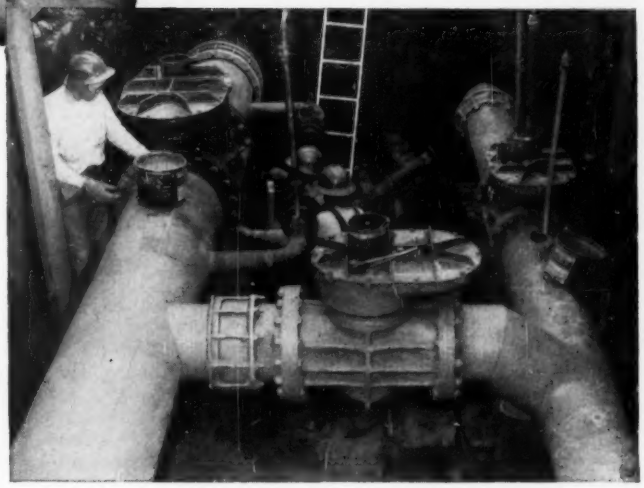
Dresser Couplings eliminate time-consuming, exact pipe fitting since they accommodate minor misalignments and still make positive, gas-tight joints. The time required for installation is essentially the two-man-minutes per bolt that it takes to make each Dresser Coupling a permanent, vibration-proof joint. And Dresser-Coupled joints will easily last the life of the line.

1. PREFABRICATION of the valve assembly speeds and simplifies installation, cuts shutdown time, and provides ample opportunity for joining and testing the joints of pipes with differing diameters or of differing materials *without the* excessive shutdown time required if this were done in the trench.





2. POSITIONING and lowering into the trench takes little time. The prefabricated valve assembly is complete with Dresser Couplings. Minor misalignments are readily accommodated; these flexible joints provide ample play for inexact pipe lengths or subsequent strains caused by ground settlement or vibration.



3. BOLTING UP the Dresser Couplings completes the installation. There has been a minimum of shutdown of the major lines; the installation has been fast, simple, economical . . . and most important, it is *permanent.*

DRESSER MANUFACTURING DIVISION

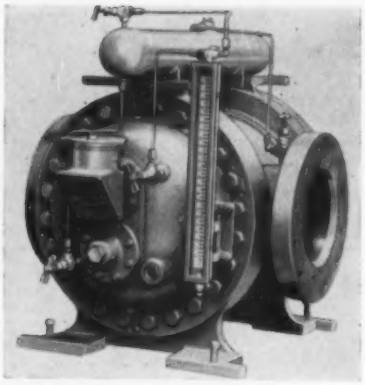
ONE OF THE DRESSER INDUSTRIES

Bradford, Pennsylvania • Chicago • Houston
New York • S. San Francisco • Toronto & Calgary

GAS DIGEST

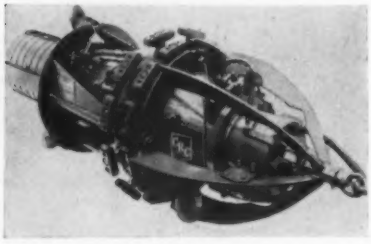
New Products and Trade Literature

For more data on any of these items use the Readers' Service Card on pages 83, 84



1. High-pressure meters

Roots-Connersville new high pressure gas meters span a range of flow measurement from 7 to 38 MMscf per 24-hr day at maximum pressure. The four sizes provide sustained accuracy of ±1 per cent through a flow range from 10 to 100 per cent of rated capacity. Accuracy of the R-C rotary meters is unaffected by pulsation or line surge. Other advantages include minimum maintenance and servicing, ease of installation, and space savings.
Roots-Connersville Blower



2. Line-up clamp

A new air-operated line-up clamp is said to neither mar nor scratch pipe. The fast-operating clamp is designed for 20- through 36-in. pipe. Most important new feature of the C-R-C Air Clamp is rollers which roll pipe into perfect round without friction or sliding of clamp on pipe surface. Pneumatically controlled heads operate independently for quick, positive line-up.
Crutcher-Rolfs-Cummings Inc.

3. Sideboom

The Little Boomer all-hydraulic sideboom from Midwestern Manufacturing is available for mounting on Ford series 1800 industrial wheel tractors. The new sideboom has a lifting capacity of 5000 lb. Mounted on the rubber-tired tractors, the unit is especially adaptable to pipe laying work in urban areas. Both of the specially designed winch drums are in full view of the operator.
Midwestern Manufacturing Co.

4. Control equipment

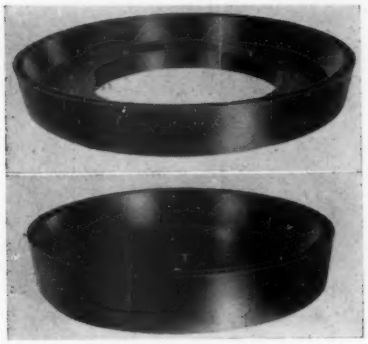
General Controls has new oil field automatic control equipment to be used with its well test controller. It includes accumulation of data from up to 40 wells by one controller and transmission by wire over any distance to a remote data center, which receives reports from as many as 20 controllers.
General Controls Co.

5. Weld preparation

The new Wachs Bev-L-Grinder is designed to make on-the-job "machine shop" accurate weld bevel preparation in 6- to 18-in. pipe. The accurate tool does not change physical properties of the pipe, making it possible for field crews to get highest quality welds. Cutting action is fast, accurate and easy to control. Operator simply rotates grinder head around a self-centering spindle.
E. H. Wachs Co.

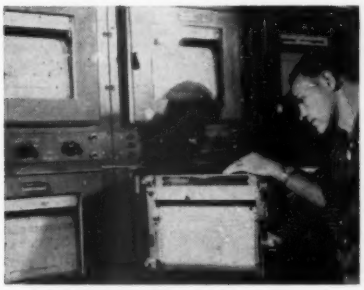
6. Truck body

A new all-purpose body for 1-ton trucks is for use on jobs that are too heavy to handle by hand and too light to handle economically with 1½- and 2-ton trucks. The new body is a smaller version of the Leland "packaged unit." The "Junior" unit has a rolling tail pipe of 4½-in. OD schedule 80 seamless pipe mounted on shielded ball bearings. Gin poles are of 7⅞-in. OD heavy wall seamless pipe.
Leland Equipment Co.



7. Pipeline scraper cup

Taprseal, a new pipeline scraper cup, is made of a compound specially developed to retain its physical properties under normal operating conditions. The new cup offers maximum resistance to wear and tear with minimum swelling. Tapered design eliminates high stress points, distributing stress evenly over a wider cup area. Cups range from 2- through 36-in. sizes.
T. D. Williamson Inc.

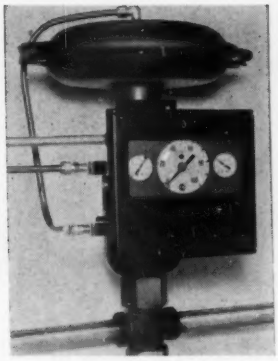


8. Recorder ink

Recording instruments using capillary-type writing capsules actually can cause the loss of test results if there is clogging, skipping, missing or smearing due to the ink. Formulabs has come up with a new ink especially compounded for ball-pen application to recording instruments. This new ink reportedly eliminates all of the problem formerly connected with ball-pen operation in recording instruments.
Formulabs Inc.

9. Pipe adapter

Wheeler's new pipe adapter is designed to increase capacity of pipe-holding devices with a 2-in. maximum capacity. It can be used with a power drive to cut 2½- through 4-in. pipe. And, it will handle pipe through 4-in. diameter for manual cutting and threading operations in conjunction with any 2-in. or larger pipe vise.
Wheeler Mfg. Corp.



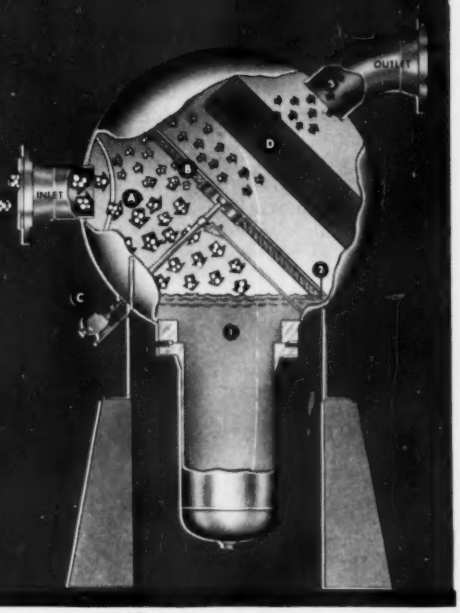
10. Pilot positioner

Two functions are combined in one valve-mounted unit: (1) an indicating pneumatic controller for temperature or pressure; and (2) a "valve positioner," which amplifies air power to provide accurate and rapid positioning of a pneumatic-operated control valve. By being located close to the process and to the valve it controls, the Pilot Positioner minimizes transmission lags and provides a higher order of precision and speed.
U. S. Gauge Division

SCRUBOSPHERE* ...

FOR Cleaner Gas AT Less Cost!

*PEERLESS SPHERICAL DUST and LIQUID SCRUBBER FOR GAS PIPELINES



- The **dust removal ability** of the SCRUBOSPHERE **is superior** because it utilizes wetted surfaces for dust collection which are much more closely spaced than in conventional equipment.
- **Oil loss is minimized** because the oil used to wet the dust collecting surface is lifted mechanically instead of bubbling gas through the oil which results in foaming and loss due to creation of hard-to-separate fine particles.
- **Maximum performance and low cost** — The spherical design means high capacity and performance because it provides maximum dimensions for the contactor and mist extractor which normally are limiting factors in scrubber designs. The vessel cost is reduced because required vessel thickness is only one half that required for cylindrical vessel of same diameter.
- **Versatility** — separates solid and liquid particles with equal efficiency.
- **Low pressure drop** — ½ to ¾ psi at rated capacity depending on nozzle size.

PEERLESS MFG. CO. DALLAS TEXAS

PEERLESS MANUFACTURING CO.

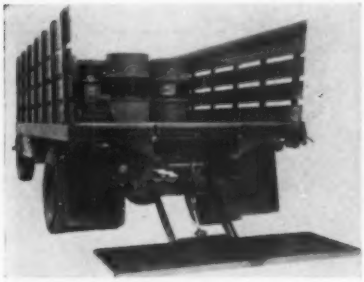
P.O. BOX 13165 DALLAS, TEXAS
Representatives in All Principal Cities

Write for test data showing dust removal and oil loss of Peerless Scrubosphere as against conventional dust scrubber.

"OVER 20,000 SEPARATORS and SCRUBBERS IN SERVICE"

11. UPVC-lined fittings

New UPVC-lined steel fittings are said to relieve mechanical stress problems and to increase allowable pressure-temperature limits when handling corrosive fluids in unplasticized polyvinyl chloride pipe. Production includes 90- and 45-deg elbows as well as tees with flanged ends or Victaulic grooved ends. Eight-, 10- and 12-in. sizes are available.
Tube Turns Plastics Inc.

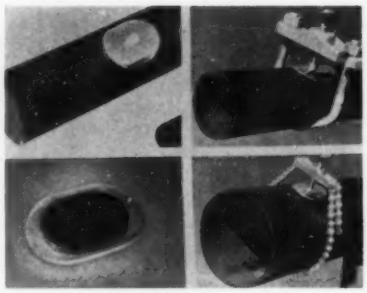


12. Tailgate loader

Venco tailgate loader is for all trucks from ¾ to 2½ tons. With a 1500-lb capacity, the hydraulic loader does the work by pushbutton. Loads slide into truck from ramping gate which slopes down to ground level at the rear edge when lowered. As it raises, the gate levels off to hold tail loads steady and firm. Safety latches hold tailgate in upper position so loads can be carried on the tailgate without losing hydraulic power.
Santa Anita Mfg. Corp.

13. Trencher

A completely new 12-hp Ditch Witch cuts trenches to 5-ft depths and 12-in. widths. Model M-322 is scaled up from Model M-3 to handle wider and deeper trenches and tougher digging conditions. It is powered by a Wisconsin AGN 12-hp, air-cooled engine.
Witch Marketing Co.



14. Leak repair

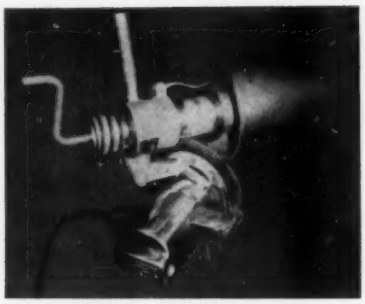
Leaks in any piping carrying gases or fluids can be repaired with Crose permanent pipe patch and tools without shutting down the line. Pipe Patch, with its bonded neoprene gasket, is placed over the leak. Pressure applied by the tool immediately seals off the leak. Pipe Patch may then be welded and tool removed, or tool may be left indefinitely on Patch and pipe. Saddle type tool is for use with ¾- through 6-in. pipe; chain type handles 7- through 36-in.
M. J. Crose Mfg. Co.

15. Plastic ball valve

Chemtrol's new all-plastic 3-way valve is especially designed for systems handling corrosive liquids. Feeding to the inlet, flow can be diverted in either of two directions, or a complete shutoff can be effected. The valve is presently available in various combinations of ½-, ¾-, and 1-in. port sizes.
Chemtrol

16. Electronic counter

The Electronaflo counter is said to completely eliminate all errors due to transposition of numbers and incorrect subtraction while integrating circular flow charts. The counter easily adapts to current integrators. It automatically registers on counter tubes the number now recorded as the mechanical counter difference as the operator follows the chart lines on the integrator.
Flow Measurement Co.



17. Grinding machine

An electric motor driven grinding machine has been developed to smooth and put the lands on bevels automatically. H&M's "Bevel-Land" grinder comes in two models for pipe ranging from 6- to 36-in. diameter. The lightweight, portable machine can be locked in place inside the pipe in seconds.
H & M Pipe Beveling Machine Co.

18. Gas light

The Imperial gas light has become the 7th in the expanding line of "Gaslites by Arkla." The new model features a distinctive golden eagle crest, a sharply tapering glass area, hurricane-style chimney, and a decorative glass gallery. Available with an 8-ft, 3-in. diameter post, it measures 14⅜-in. in height and 13¼ in. wide.
Arkla Air Conditioning

19. Aluminum meter

American's newest aluminumcase meter has a rated capacity of 800 cfh at ½-in. w.c. differential and 20 psi working pressure. According to the company, Model AL-800 has two important advances in its design. It operates at only 2.6 revolutions per cu ft of gas, providing greater accuracy and longer meter life. And, the American design of valve motion and related parts eliminates angular errors of working parts to provide marked reduction in wear.
American Meter Co.

FOR MORE INFORMATION

about New Products in this Issue . . . . .

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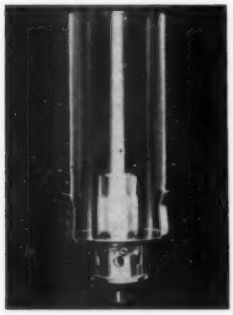
20. Service connection

Thermotap is a new service connection which is completed in minutes. No external source of power is required. The actual connection is a fusion weld which is permanent and cannot be loosened by vibration. It requires no bolting, threading, or cutting. It has been found suitable for gas light installations and similar connections.
Continental Industries Inc.



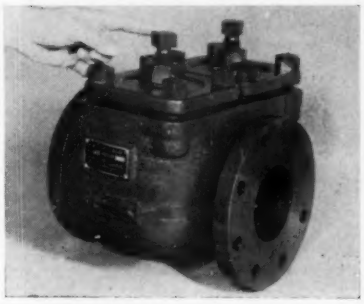
21. Gas light chimney

A distinctive and modern air is created for gas lights with the easy-to-install Cambria chimney set. Maxitrol's chimney sets consists of a heat-resistant, fire polished clear glass cylinder, stamped aluminum holder bracket, and lock washer for attachment to the gas light burner. To assemble, simply drop bracket on burner, push on lock washer with a 1-in. pipe or other similar tool, then insert chimney.
Maxitrol Co.

---

22. Proportioning valve

A new line of air-gas proportioning valves for either manual or automatic operation is announced by Eclipse. Five sizes of Varitrols are available. The valves are designed to provide an economical two-in-one valve method of controlling air and gas to provide the proper blending required for any firing condition. Either electric- or air-operated automatic controls may be used with automatic Varitrols.
Eclipse Fuel Engineering



23. Check valves

A new line of gas and air check valves features the air cushion valve design used in Pennsylvania Pump's gas and air compressors. Flat, annular, stainless steel discs, guided at outer periphery, lift against a cushion of gas or air. This action is said to increase service life and eliminate "slam." Air-chek valves can be installed in any position, can be inspected and renewal parts installed without disturbing piping. To inspect, simply remove valve cover (see photo).
Pennsylvania Pump

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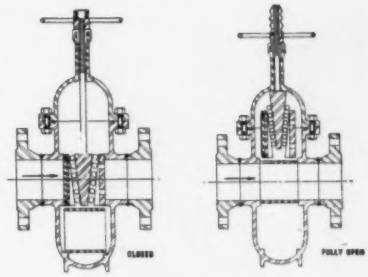
24. First aid kit

A window in the cover of the Davis first aid kit increases safety by cutting chances of running out of important supplies. The new C-Thru kits are designed for hanging on the wall.
Davis Emergency Equipment Co.



25. Anti-friction unit

A new anti-friction unit for gate valves employs a self-sealing synthetic rubber seal gasket. The new assembly assures higher working pressures, is drop-tight, and eliminates need for mechanical operators, according to the company. It consists of a tapered wedge assembly—mounted on roller bearings—that controls movement of the valve discs. Initial closing and opening movement of discs is in a horizontal plane, directly against or away from valve seats. There is no dragging disc across the seat and rubber seal.
Charles Wheatley Co.

TRADE LITERATURE

26. Zone control

A 70-page design handbook covers all aspects of low cost, zone control hot water baseboard heating for new homes. Included are sections on construction, installation, dimensions, specifications, features, and photographs.
Edwards Engineering Corp.

---

27. Two-way radio

A 4-page folder, "Two-Way VHF-FM Mobile Radio System," describes the new Aerotron Model 6N15. This is an extremely compact unit featuring new circuits and a 6-, 12-, and 115-v power supply.
Aeronautical Electronics Inc.

---

28. Gasketing material

A technical bulletin from Du Pont describes a new gasketing material. It is "Armalon" TFE-fluorocarbon felts impregnated with Teflon. Properties, potential uses, case histories and availability, along

NEW Lancaster VALVE COVER
eliminates practically all troubles from normal sticking and lifting valves . . .
* Gum-resistant ring Specially compounded of friction-free inert carbon-graphite
New Lancaster Valve Cover has the most level and truly concentric seat surface ever achieved. Special compound of carbon-graphite is strong, shock resistant and silent . . . ends valve squeaks and is far less apt to break or chip in transit, repair or installation.
Large ½-inch stud is made of long wearing nickle-silver. It's rounded and swaged into the rugged brass shell . . . allows continual, positive contact with any driving dog position.
* Large-Profile Stud offers greater contact area
New, Improved Lancaster Carrier Wire Assembly
keeps pans moving in straight line . . .
Side carrier bracket height adjustment assures most accurate positioning . . . oval slots in new center bracket allow straight through diaphragm travel. Center bracket available separately adapts to any carrier wire. Porous bronze graphite bearings throughout.
"a meter is only as accurate as its parts"
Lancaster METER PARTS CO.
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TRADE LITERATURE

Continued from preceding page

with a table of physical properties, are included.
Du Pont Fabrics Division

29. Construction

Le Roi has revised its bulletin on "Products for the Construction Industry." Bulletin CG-15 has new photos and information on rotary and piston type portable air compressors, the improved Tractair, and air tools.
Le Roi Division

30. Metering LPG

American Meter Co. has published a comprehensive "Guide to L.P. Gas Metered Service." Included in the guide are details on handling, installing and testing LPG meters. Tables cover such subjects as approximate conversion factors for propane, equivalent length of pipe for various fittings in feet, sizing LPG pipe or tubing, meter selection chart, and meter history cards.
American Meter Co.

31. "New workhorse"

Exploration, construction and supply by helicopter are among topics covered in a new bulletin. Photos of the Hiller 12 E helicopter at work in the field, brief performance specifications and information on charter operator services are also presented.
Hiller Aircraft Corp.

32. Corrosion prevention

A new concept in the marketing of pressure sensitive plastic tape coatings for corrosion prevention on pipe is described by the Corr-Prev division of Chase & Sons. The company has created an extensive series of booklets, one of which, the Technical Handbook, discusses techniques and practices of tape application.
Chase & Sons Inc.

33. Gate valves

A new circular lists service ratings, sizes and dimensions, and material specifications for all of Walworth's iron body gate valves —valves that have application in many industries, including gas transmission. A section of the circular is devoted to higher strength cast iron wedge gate valves.
Walworth Co.

34. Tractor shovels

Operating performance and maintenance advantages of Allis-Chalmers HD-16G and HD-21G torque converter drive tractor shovels are covered in an 8-page catalog. Catalog MS-1274 describes production-boosting features of both units. Text is aided by many illustrations.
Allis-Chalmers Mfg. Co.

35. Regulators

A new brochure describes the complete Beam line of LPG and natural gas regulators. Horsepower ranges from 2 to 500 with detailed specifications and applications are illustrated and discussed.
Beam Products Mfg. Co.

36. Hydronics sales kit

What has been described as the "most complete sales aid kit ever assembled on hydronics" has been produced by the Permaglas division. The kit, designed especially to support Permaglas' increasing interest in the home hydronic market, provides all the literature and display tools needed to enable the wet-heat advocate to compete effectively.
A. O. Smith Corp.

37. Orifice plate sealer

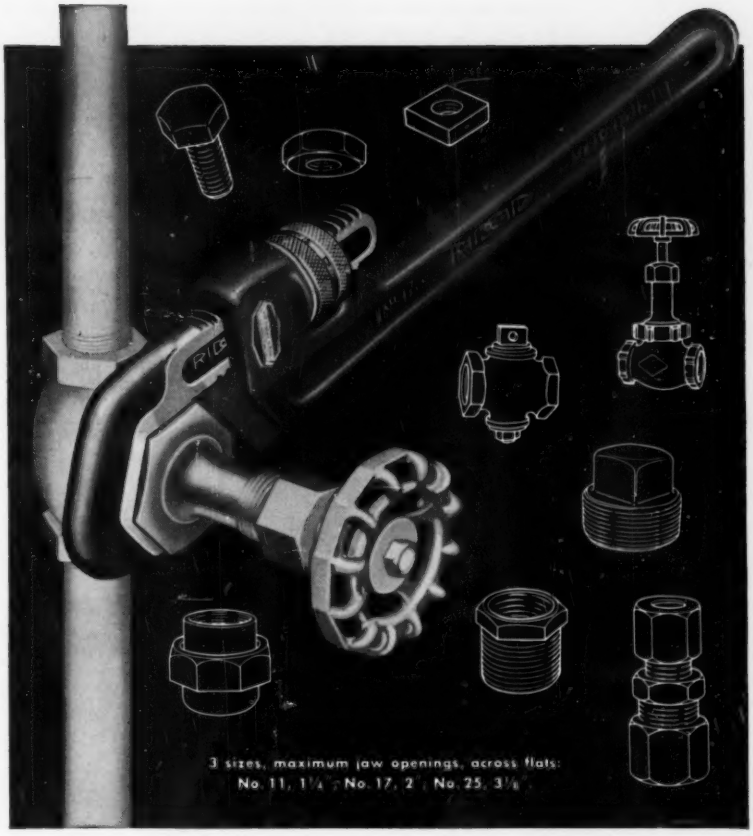
A new specification bulletin on orifice plate sealing units covers three types of Daniel-designed units: The dual seal, the plastic Teflon seal, and the metallic seal. All Daniel sealing units are interchangeable.
Daniel Orifice Fitting Co.

38. Hinged closure

One-man hinged closures with built-in safety features for vacuum, low and high pressure service in gas transmission are described in a new brochure. The one-weld installation, easy maintenance, and one-man operation are illustrated. Charts give dimensional specifications.
Tube Turns

39. "Compressed Air Fundamentals"

Ingersoll-Rand has published "Compressed Air Fundamentals" to help in the selection of small packaged air compressors for either automotive or industrial use. The booklet also describes compressed air, how it is compressed, single- and two-stage compressors, and piston displacement.
Ingersoll-Rand Co.



Master of Every Nut and Bolt...

NEW RIDGID® Hex Wrench

Wide-open fast-action multi-sided grip on every hex, square and flathead!

"Got the RIDGID name on it? ... Okay, I'll take it!"

Quick adjustment—stays to size . . . this new Hex Wrench goes on easily, won't slip off—harder you pull, the tighter it grips . . . no more skinned knuckles or rounded nut shoulders! Narrow jaw for close quarters. Famous RIDGID heavy-duty design, guaranteed housing, comfort-grip handle. Three sizes for ⅜" to 2" nuts. Make your work easier and faster — buy new RIDGID Hex Wrenches at your Supply House!

The Ridge Tool Company Elyria, Ohio, U.S.A.

THREADED PIPE ... It's Tight ... It's Best ... Costs Less!

GAS · ASSOCIATIONS

Arizona's Lucking heads PCGA

Walter T. Lucking, president of Arizona Public Service Co., was elected president of the Pacific Coast Gas Association at its recent convention. Lucking takes over from R. R. Blackburn, senior vice president of Southern California Gas Co.

Other officers elected for the coming year are: 1st vice president, H. G. Dillin, executive vice president, San Diego Gas & Electric Co.; 2nd vice president, W. J. Bailey Jr., president, Day & Night Manufacturing Division, Carrier Corp.; treasurer, L. W. Coughlan, comptroller, Pacific Gas & Electric Co.

Walter T. Lucking (left) takes over the presidency of PCGA from outgoing president R. R. Blackburn, during the association's annual convention held in Los Angeles recently.

General chairman of the four sections of PCGA are: Operating, James F. Gary, vice president, operations, Washington Natural Gas Co.; sales and advertising, H. M. O'Haver, central division sales manager, Southern California Gas; administrative services, C. W. DeVoe, comptroller, San Diego Gas; and manufacturers, S. F. Skafte, director of engineering, Utility Appliance Corp.

Several companies join GAMA groups

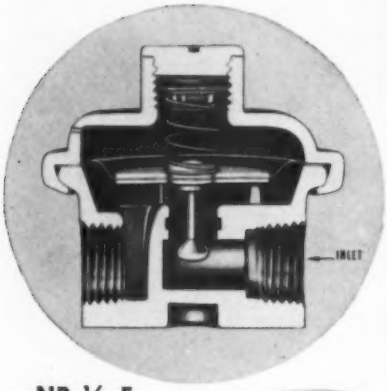
Several companies have been elected to membership in GAMA divisions.

National Steel Construction Co., Seattle, and Thermo-Pak Boilers Inc., Alhambra, Calif., are new members of the gas boiler division. National Steel also is a member of the association's gas water heater division.

New member of GAMA's gas clothes dryer division is Suburban Appliance Co., Morristown, N. J. Suburban also is a member of the direct heating, gas furnace and gas wall and floor furnace divisions.

Gaslite

SERVICE REGULATORS



NR-⅛-E

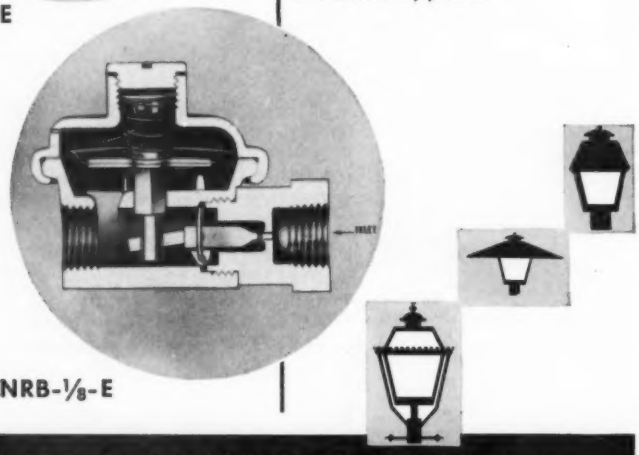
NR-⅛-E

- An appliance regulator designed for inches w.c. to inches w.c. regulation.
- Insures constant pilot flame.

NRB-⅛-E

- A unit designed for flat rate gas lite installations ahead of meter.
- Construction similar to proven house service regulators by Reynolds.
- Inlet Pressure 1-60 Psi. Outlet Pressure Inches W.C.

May be installed inside Gas Lite Post.
Models available in ⅛" and ¼" IPS or any combination.
Units individually packed.



NRB-⅛-E

REYNOLDS GAS REGULATOR COMPANY, Inc.
ANDERSON, INDIANA, U.S.A.
A Subsidiary of Arkansas Louisiana Gas Company

Use of company owned planes increasing

The oil and gas industries have emerged as the foremost exponents and users of corporate aircraft. This finding comes from a recent survey made for the Garrett Corp.'s AiResearch Aviation Service Division.

Oil company officials pointed out that the very nature of their far-flung operations made corporate aircraft "a natural" for transporting executives, engineers and others to vital points on a "where and needed" basis.

Among gas transmission companies using aircraft are Texas Eastern Transmission Corp., with a DC-3 and three other planes. Also, Colorado Interstate Gas Co. and Northern Natural Gas Co.

Tennessee Gas Transmission Co. has just bought a Vickers Viscount 810 series airliner. This is the first use of the new larger and faster Viscount as an executive transport.

Canada's largest army center going gas

One of Canada's largest army centers will "go natural gas" this winter. The Department of National Defense and Consumers' Gas Co., Toronto, have signed an agreement to convert Camp Borden.

The coal-burning central heating equipment of 260 family dwelling units will convert to gas early in December. Total individual installations to be changed is 600, including appliances of various kinds in drill halls, barracks, messes, and work shops.

Fuel consumption in the first full year of operation is an estimated 350 MMcf.

Consumers' is acting as prime contractor. It will carry out conversion of appliances, build transmission line and distribution systems, supply the gas, operate the system, and service the gas equipment.

Over $1.1 million will be spent—$800,000 for the transmission line, distribution system and metering and control facilities, and over $300,000 for appliance conversions.

Contracts for 30 miles of line have been let to F. E. Shaw Ltd., Somerville Pipeline Contractors, Mid-Canada Contractors, all of Toronto; and Corcoran Pipeline Contractors, Kingston.

NOW ***from PARSONS . . . a complete line of WHEEL Trenchliners to fit any job***

Big things have happened since you last looked at wheel-type trenchers. Today, you'll find the *right answer* to your job . . . the *right size* wheel machine for lowest cost per lineal foot of trench, in the big, well-rounded Parsons® line. There's extra capacity, performance and dependability in every size. Check the chart below . . . pick the Trenchliner® that best suits your requirements . . . then contact Parsons distributor for a demonstration. See him soon . . . or mail coupon for more information.

MODEL	TRENCH WIDTHS	MAX. DEPTH	DIGGING SPEEDS
130	12 to 24 in.	5¾ ft.	12 in. to 18 ft. per min.
150	16 to 26 in.	5¾ ft.	12 in. to 25 ft. per min.
170	20 to 32 in.	5¾ ft.	12 in. to 25 ft. per min.
420	36 to 52 in.	7½ ft.	15 in. to 25 ft. per min.
520	40 to 52 in.	8½ ft.	12 in. to 28 ft. per min.

Also: 5 ladder-types for digging 6 INCHES to 6 FEET wide . . . up to 19 FEET deep

mail to: PARSONS Company, NEWTON, IOWA

Send literature on: ☐ 130 ☐ 150 ☐ 170 ☐ 420 ☐ 520 Trenchliner

NAME..... TITLE.....

COMPANY..... DIV.....

STREET.....

CITY..... STATE.....

☐ Also interested in ladder-type Trenchliners P923 GAS

PARSONS Company • NEWTON, IOWA

A DIVISION OF ROEHRING COMPANY

AL-250

ALUMINUMCASE METER

1. SLOW-SPEED OPERATION
2. SUSTAINED ACCURACY
3. LIGHT WEIGHT

- American® AL-250 Aluminumcase Meters operate at only 7 revolutions per cubic foot providing ample power, greater accuracy and longer life.
- Molded, 3-convolution Duramic diaphragms for all fuel gas services.
- Light weight, high impact strength, die-cast aluminum alloy body reduces shipping, handling and setting costs.
- Easy reading vented index box for full index visibility.
- Rated capacity 250 cfh of 0.60 sp. gr. gas at ½-inch w.c. differential — 5 psi working pressure.

AMERICAN®
METER COMPANY
INCORPORATED (ESTABLISHED 1836)

General Offices: Philadelphia 16, Pa.
Sales offices in principal cities.

New York's 1964 fair gets enthusiastic support

Enthusiastic support of the proposed 1964 New York City World's Fair is coming from the gas industry.

Representatives of AGA and GAMA took the first steps toward creating an appropriate exhibit at a recent meeting. This is believed to be the first official endorsement of the fair by an industrial or commercial group.

"Your Program for a New York City World's Fair in 1964 with the theme 'Peace Through Understanding' has the gas industry's enthusiastic endorsement," read a telegram sent by the associations to New York Mayor Robert F. Wagner and Thomas J. Deegan, Jr., chairman of the New York World's Fair-1964 Corp. "We believe that AGA and GAMA, which together sponsored the Gas Industries' Building exhibit at the 1939-40 fair, will be ready, able and eager to contribute an even bigger effort to help make the 1964 venture an unprecedented success."

Harold Massey, GAMA managing director, recalled that the Gas Industries' Building was one of the most popular and outstanding features of the 1939-40 exposition. An estimated 5.5 million persons visited the Court of Flame, theater, exhibit hall, restaurant, and all-gas home.

The building was lit at night by gas-operated flood lights. Probably best remembered, though, are the four 12-ft high gas torches, called flambeaux, which dominated the Court of Flame like ceremonial urns of ancient Greece. Each flambeau represented a major use of gas in the home—cooking, house-heating, water heating, and refrigeration.

Gas played a major role in other buildings of the fair, too. It was used for heating and water heating. It was the fuel used almost exclusively in the preparation of thousands of snacks and full meals served to the fair visitors and employees every day. A number of outdoor displays also used gas for dramatic effects, notably the spectacular nightly story dramatizations in the Lagoon of Nations.

The Gas Industries' Building had the distinction of being the first private structure for which ground was broken at the fair site. "That's a record we will strive to repeat this time," agreed Massey and C. S. Stackpole, AGA managing director.

Alabama gets franchise

Alabama Gas Corp., Birmingham, has a franchise to serve a fast-growing community in Shelby county, Ala.

The Shelby County Board of Revenue and Control awarded Alabama Gas the franchise because its plans called for larger mains than those offered by other bidders.

Industrial control devices are demonstrated in a new display coach touring the nation for Fulton Sylphon Division of Robertshaw-Fulton Controls Co. Mounted display panels feature parts and assemblies of virtually all products of the division, including newly developed items.

ADD LOADS . . . . . +
SUBTRACT COSTS . . . . . —
MULTIPLY PROFITS X

SIMPLE ARITHMETIC PROVES

WELDED STEELCASE METERS BEST

Modern American® Welded Steelcase Meters combine hard-case durability with proven tinned steelcase performance to provide a new approach to the economics of meter maintenance and retirement.

Low first costs – long-term maintenance savings. Major repairs eliminated – minor repairs and adjustments are easy to make assuring long service life.

Lifetime weather and corrosion resistant finish stays attractive in both indoor and normal outdoor settings. Special impervious coating for highly corrosive atmospheres also available.

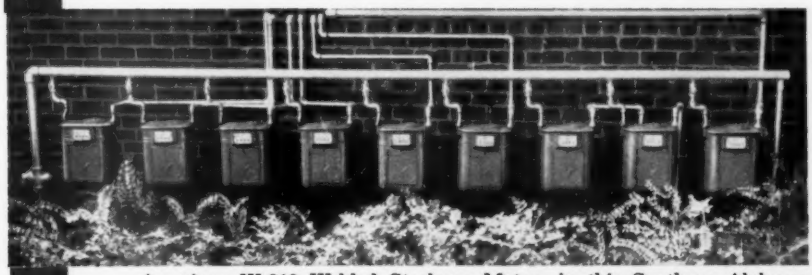
Sustained accuracy is built into these meters with proven speed ratio and the many time-tested quality features and refinements pioneered by American in more than 120 years of meter engineering.

Ask your American representative about Welded Steelcase Meters and their many advantages for all fuel gas services.

W-210 Welded Steelcase Meter
Rated capacity 210 cfh for medium-sized homes with heating.

W-75 Welded Steelcase Meter
Rated capacity 75 cfh for average homes without central heating.

W-45-LPG Welded Steelcase Meter
Rated capacity 45 cfh propane for average domestic services without heating.



American W-210 Welded Steelcase Meters in this Southern Alabama installation insure dependable, accurate measurement and long-term outdoor service without rusting.

AMERICAN®
METER COMPANY
INCORPORATED (ESTABLISHED 1836)

GENERAL SALES OFFICE: Philadelphia 16, Penna. • Albany • Atlanta • Baltimore • Birmingham • Boston • Chicago • Dallas • Denver • Houston Kansas City • Los Angeles • Minneapolis • New York • Omaha • Pittsburgh • San Francisco • Seattle • Tulsa • Wynnewood

IN CANADA: Canadian Meter Company, Ltd., Milton, Ontario • Calgary • Edmonton • Montreal • Regina • Vancouver

SUPPLIERS TO THE GAS INDUSTRY for Ironcase, Tinned Steelcase, Aluminumcase and Welded Steelcase Meters • American-Westcott Orifice Meters • Instruments • Reliance Regulators • Apparatus • Valves

East Ohio launches Gold Star Days promotion

One of the most comprehensive utility promotional campaigns ever developed is under way in northeastern Ohio.

The campaign, "Gold Star Days," is being sponsored by East Ohio Gas Co. for seven weeks. It runs through Nov. 14. Newspapers, TV, radio, outdoor posters, and a wealth of other advertising materials are being used.

Goal: sell 4000 Gold Star gas ranges.

The campaign is designed to provide a more modern image of gas, improve quality of each sale, and synchronize promotion at all distribution levels.

To achieve the goal, East Ohio and its agency, Ketchum, MacLeod & Grove, decided on an unusual design approach and complete use of advertising supports to highlight quality, performance, and modern design features of Gold Star gas ranges. All promotional material employs an omnibus-type design treatment, highlighted by sectionalized views of gas ranges and other decorative fashions and designs.

Omnibus-type design treatment dominates point-of-sale material in typical dealer display during East Ohio's Gold Star Days campaign.

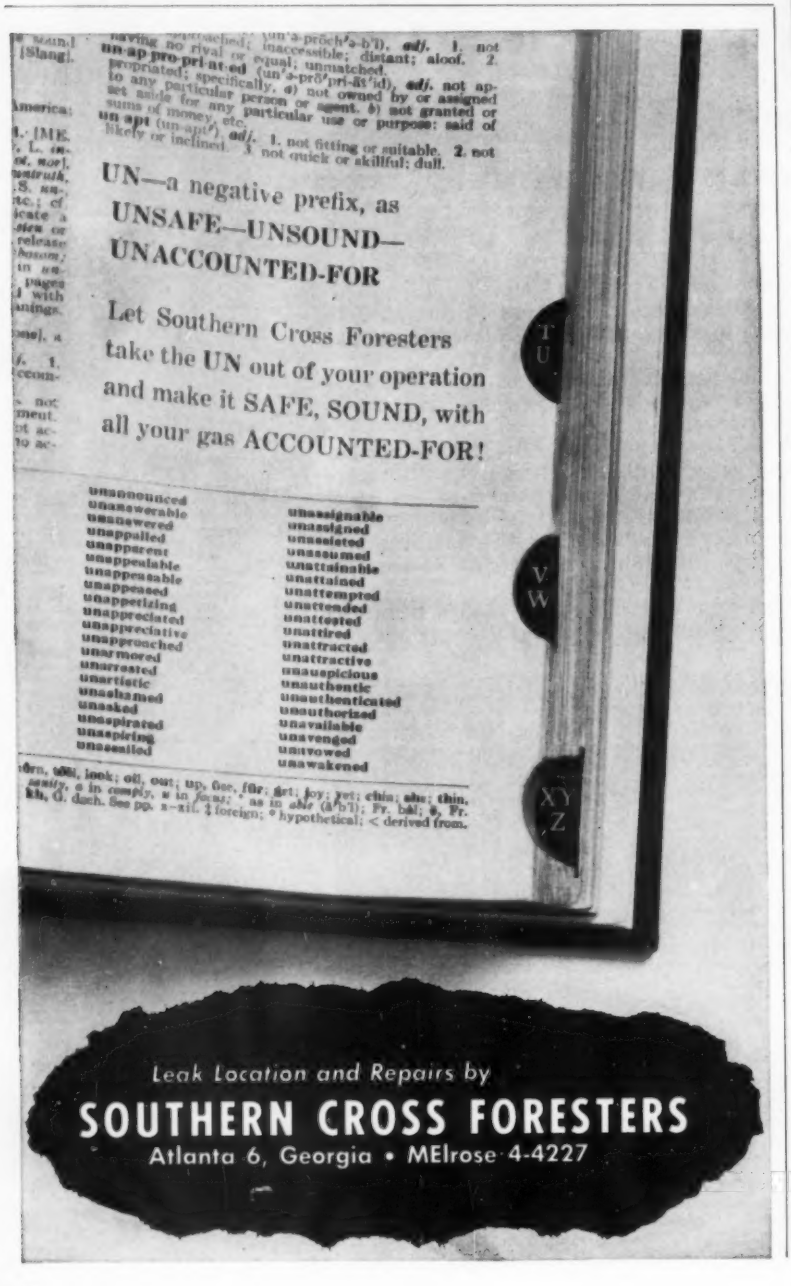
Eleven gas range manufacturers joined forces in the regional sales effort: Caloric, Dixie, Hardwick, Kenmore, Magic Chef, Norge, RCA Whirlpool, Roper, Sunray-Grand, Tappan, and Universal. They are supporting the campaign by running a minimum of 220 in. of advertising over dealer signatures in newspapers throughout East Ohio's service area.

The campaign was kicked off with a 2-page, 2-color spread; followed by four 100-in. ads in 19 dailies.

A new filmed commercial was specially developed for the campaign. This 20-second spot is slated for use 150 times on seven major TV outlets. Other TV support comes from live range demonstrations on East Ohio's own nightly news show.

Radio-wise, 19 key stations are carrying a new jingle, actually the sound track of the TV film, in 1000 spots.

More than 200 outdoor boards are being used for "teaser" ads and "answer" posters.



Top management engineers speed industry progress

Consumer-minded engineers in top management posts are credited with the rapid progress of the gas appliance and equipment industry. These men make it their business to know as much about homemakers' needs as they do about burn-

ers, valves and fuel characteristics.

Speaking was Keith T. Davis, president of the Gas Appliance Engineers Society. Davis also is manager of the air conditioning activities of Bryant Manufacturing Co., Indianapolis.

"With engineers in positions of authority, most gas equipment makers are able to short-cut the usual managerial chain of command in determining what the public wants and producing it while the demand still exists," he claimed.

He said that 40 per cent of the top-official delegates to the most recent GAMA convention were engineers.

"This enables us to short cut, rather than short circuit, the trip to market," Davis said. This facility for quick decision, he pointed out, has accounted in part for the timeliness and success of many recent gas equipment developments. These include:

1. The Gold Star gas range program. Here, 28 required features and two of five optional improvements were accepted and incorporated in 1959 ranges by 21 manufacturers with a minimum of time lost in re-tooling and production.

2. Gas water heater improvements — assuring elimination of tank corrosion through the use of glass and metal alloy tank linings and plastic dip tubes.

3. Compact design of gas central heating equipment, ducts and pipes to permit simple installation and space-saving advantages.

4. Production of gas clothes dryers, readily adjustable to laundering needs of "miracle" fabrics.

5. Design of a new gas incinerator that reduces the average home's daily output of garbage and trash to a handful of ash without a trace of smoke or odor.

6. Production of a variety of gas refrigeration and air conditioning equipment.

California rejects plea

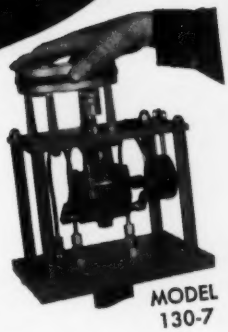
California's PUC refused to reconsider its ruling that placed Richfield Oil Corp. in the public utility bracket (see GAS Highlights, September, p. 8).

The case involved Richfield's construction of a pipeline from the San Joaquin valley to the Southern California Edison Co. steam plant near Oxnard.

The commission ruled that Richfield must file rate schedules with the PUC and submit to PUC jurisdiction.

ARCCO

Arcco-Anubis CONTINUOUS GAS SAMPLER



MODEL 130-7

FOR OBTAINING REPRESENTATIVE GAS SAMPLES TO DETERMINE CHEMICAL AND PHYSICAL PROPERTIES OF GAS.

For obtaining more accurate gas sampling, this proven Arcco-Anubis instrument is unexcelled. It replaces older, inadequate methods for spot sampling. This sampler will over a period of seven days accumulate at a constant rate a sample of gas to a final pressure at or near 130 psig from a sample source, the minimum pressure of which is not less than 150 psig.

Models for many other pressure ranges and sampling periods now are available.

Send for Bulletin 112-R1.

Available for early delivery.

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7142 East Condor Street, Los Angeles 22, California

AD NO. 101

SEND FOR BULLETIN No. 112-R1

1897 1959

PIPE STOPPERS OF ALL KINDS

SAFETY GAS MAIN STOPPER CO. INC.

GOODMAN
USED SINCE 1897
2" HANDLE & LOCKING SLEEVE
GAS MAIN STOPPER

523 Atlantic Avenue
Brooklyn 17, N. Y.
Cable Address GASTOPPER, N. Y.

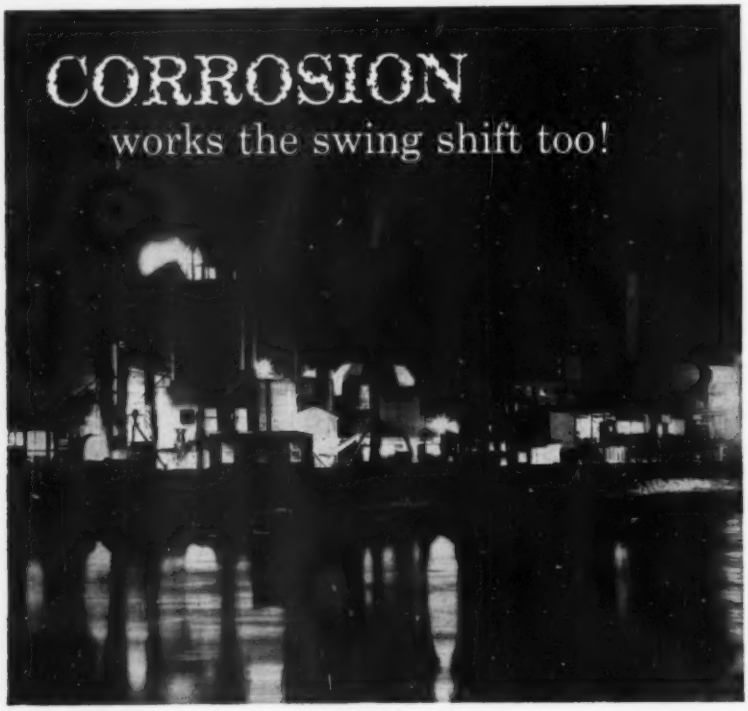
Koehring expands

Shawnee Manufacturing Co. Inc., Topeka, has been acquired by Koehring Co., Milwaukee. Shawnee makes backhoes, loaders, brooms, scrapers, rear blades, and other attachments for wheel-type utility tractors.

Shawnee will operate as part of Koehring's Parsons Division, Newton, Iowa.

Allis - Chalmers Manufacturing Co., Milwaukee, is acquiring assets of the Valley Iron Works Co., Appleton, Wis. Valley Iron will be known as Valley Iron Works Corp. and will operate as a wholly owned subsidiary of Allis-Chalmers.

Whirlpool Corp. is ending its kitchen cabinet operations to stress appliances it manufactures in its own facilities. Although Whirlpool made available a full line of sinks, steel cabinets, and steel cabinets with interchangeable wood front, it did not make the units in its own plants.



Thousands of miles of underground pipe feed natural gas to factories . . . other pipelines distribute oil and other petroleum products. And every foot . . . every inch . . . could corrode and leak anytime, day or night.

Electro Rust-Proofing can assist in the big job of corrosion control. Assist with surveys, design recommendations and actual installation of corrosion control systems.

Even if you have your own corrosion engineering group, ERP can swing extra manpower and engineering experience onto rush jobs—supplement your own team on the special problems.

For full information on ERP Pipeline Corrosion Control, Write Dept. E-52.41.

ERP CATHODIC PROTECTION SINCE 1935

ELECTRO RUST-PROOFING CORP.
A SUBSIDIARY OF WALLACE & TIERNAN INC.
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CABLE: ELECTRO, NEWARK, N. J.

GAS • PEOPLE

ROBERT B. BATTEN is assistant chief engineer of Michigan Consolidated Gas Co., Detroit. Batten, who joined Michigan in 1949 as a junior engineer in the street department, has been an assistant to the chief engineer since 1957.

Robert Batten
Mich Con

NORMAN J. LUKE, assistant to the comptroller of United Gas Corp., Shreveport, for the past two years has been elected comptroller. He succeeds R. E. HULL, retiring after more than 31 years of continuous service. W. G. MEECE, assistant to the treasurer since 1957, has been promoted to a new post, director of special services. A realignment of duties places these departments under Luke's supervision: auditing, general and plant accounting, budgets and special report, and central payroll. In his new post, Meece supervises data processing, income and property tax, rate and regulatory accounting, field accounting, and systems and procedures.

BARTLETT G. BRETZ has been named southern sales manager by United States Pipe & Foundry Co., Birmingham, Ala. He succeeds THOMAS W. MCCREERY, who has retired. McCreery's career with U. S. Pipe began at the Burlington, N. J. plant in 1912. He transferred to sales and the Birmingham office in 1930, became assistant southern sales manager in 1929, and southern sales manager in 1947. U. S. Pipe also has announced the opening of a sales office in the Detroit area. JAMES J. MCCARTHY heads the new operation. He formerly was in the Boston office.

L. L. ARMSTRONG, vice president in charge of operations of Commonwealth Natural Gas Corp., Richmond, Va. has retired. He will con-

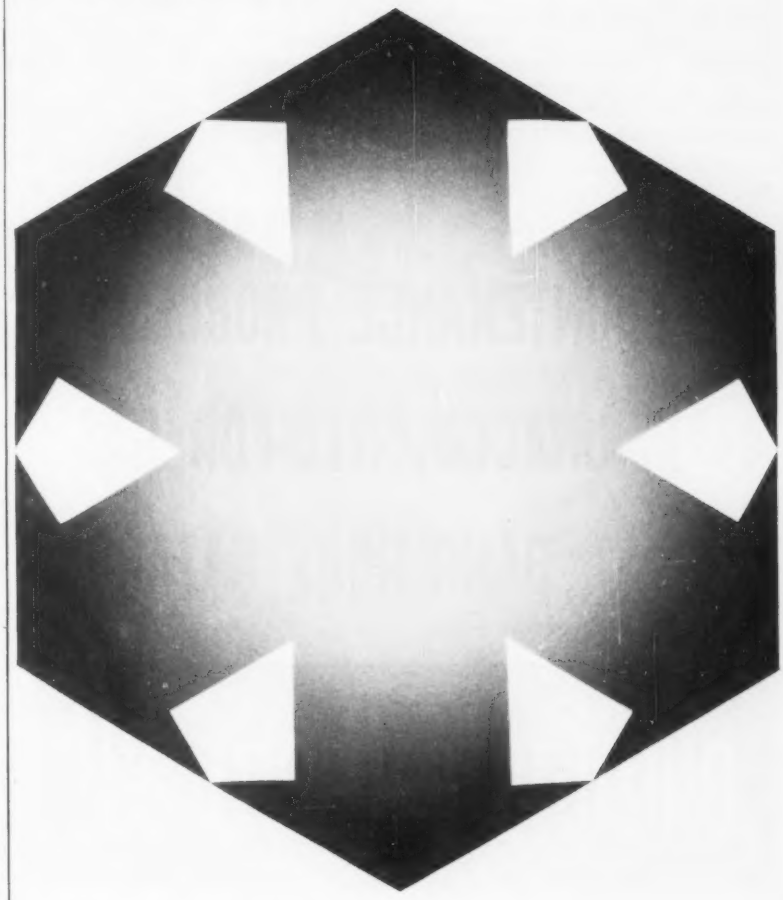
tinue to serve the company as a consultant. He joined the Commonwealth staff in 1950 and was closely associated with the design and construction of its original mainline. After that he was in charge of all line operations and supplementary construction. HARVEY S. GERMAN, superintendent of maintenance and construction, and PAUL H. RILEY, superintendent of measurement and dispatching, are taking over Armstrong's duties.

W. L. LITLE has resigned as chairman of the board of directors of Bucyrus-Erie Co., So. Milwaukee. He had been with the company for 32 years, primarily in executive capacities. He managed the Erie plant for 20 years, during which time he was named a vice president (in 1942) and a director (in 1947). In 1950 he became executive vice president, president in 1952, and board chairman in 1957. Succeeding Litle as chief executive officer is ROBERT G. ALLEN, president of the company since December 1958. A. S. PUELICHER, board member since 1945, succeeds Litle as board chairman. Newly named board members are LAWRENCE N. MURRAY and VICTOR C. STUDLEY. Studley, with Bucyrus-Erie since 1952, was named treasurer in 1954 and vice president last year.

WARREN E. MICKELSON, director of training and safety for Central Electric & Gas Co., Lincoln, Neb., has been named division gas plant manager. He succeeds GEORGE G. HOLMES, who has retired after a 40-year career in the utility field. He joined Central Electric in 1949 as superintendent, gas distribution. WAYNE E. BEAMS succeeds Mickelson as training and safety director. He has been assistant division utilization engineer.

EARL B. CUTTER JR. has been appointed southern district manager for American Meter Co.'s southwest division. He will headquarter in Dallas. Most recently, Cutter has been assistant to the vice president-sales. He joined the company in 1939 as a sales engineer.

As gas expands...



so does Empire

Whether it be a peak-shaving plant like the one recently installed in the brand-new State of Alaska, or an LP gas stand-by plant like the one providing steady flow for a manufacturing plant in Florida, Empire is expanding with gas, the world over.

EMPIRE GAS
Engineering Company
1958 Monroe Drive NE, Atlanta, Georgia

HAROLD R. SNEDDON has been promoted to East Liverpool (Ohio) division manager for Ohio Valley Gas Co. Sneddon, with the company 26 years, succeeds W. T. MCINTYRE, who has retired.

KATHLEEN G. SKINNER has been elected assistant secretary and JOSEPH S. LONG assistant treasurer of Northwest Natural Gas Co., Portland. The posts formerly were filled by the late NOBLE H. STEPHENS. Miss Skinner has been administrative assistant to the president for six years, and retains that role. Long also will continue as assistant controller.

THEODORE E. CASSELMAN JR. has been named manager of Stone & Webster Engineering Corp.'s New York office. He has been assistant engineering manager in the Boston office.

GEORGE W. DEVER has been promoted from assistant to sales manager of Union Malleable Manufacturing Co., Ashland, Ohio. Dever has been with Union since 1955.

George Dever
Union Malleable

BENJAMIN L. BINFORD has been named research coordinator of Republic Flow Meters Co., a subsidiary of Rockwell Manufacturing Co., Chicago. His task is to coordinate development of instrument controls, valve operators and allied equipment at Republic with other Rockwell divisions.

Allis - Chalmers Manufacturing Co., Milwaukee, has elected two new officers and promoted two others. New senior vice presidents are BOYD S. OBERLINK and J. L. SINGLETON. Both were vice presidents. ROY M. CASPER, general manager of the atomic energy division, and L. W. DAVIS, general manager of the farm equipment division, were both elected vice presidents.

DONALD H. BREWER, formerly senior vice president of Container Corp. of America, has been elected vice president of Rexall Drug & Chemical Co., Los Angeles. He will be the Rexall corporate officer in charge of all the company's plastics processing operations. These include Kraloy Plastic Pipe Co., Los Angeles.

NELSON E. DAVENPORT, former export sales manager of Rockwell's Meter and Valve Products, is now assistant to the vice president of Rockwell Manufacturing Co.'s Petroleum and Industrial Meter division.

EARL L. JOLLY has been appointed Pacific-Western area manager for the new Corr-Prev Division of Chase & Sons Inc., North Quincy, Mass. The appointment was made at the same time the company opened its new office in San Francisco. Chase & Sons will market a complete package of corrosion control pipe coating items.

JOE C. HARDIN has resigned as vice president and director of Arkansas Louisiana Gas Co.,

1. MAINTENANCE PROBLEMS

2. UNACCOUNTED-FOR GAS

3. DANGEROUS HAZARDS

eliminate them all!

FREE: *This booklet describing the causes of corrosion and how to prevent it can be yours by writing to us.*

Yes, all of these problems can be reduced, or **eliminated completely** with the proper application of a cathodic protection system using Standard Magnesium Anodes.

Standard Magnesium Anodes are designed to protect against **ALL** corrosion of your gas lines. For further information on how these anodes can help you prevent leakage contact:

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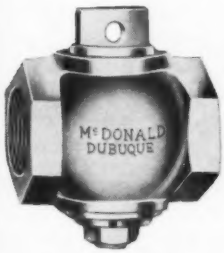
THE QUALITY NAME IN GAS SERVICE STOPS

For dependable performance, you can rely on McDonald Gas Service Stops. Engineering skill and over 100 years of manufacturing experience are your assurance of the very highest quality. Look for McDonald next time you buy. It's the quality name in Gas Service Stops.



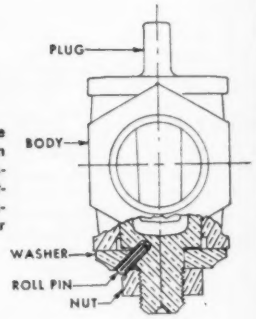
10693

Gas Service Stop. Iron Body. Flat Way. Heavy Pattern. Flat Head with Bronze Plug, Nut and Washer. With Shur-Lock Feature. Black or Galvanized.

Size Inches: ½, ¾, 1, 1¼, 1½, 2.

ROLL PIN LOCKS: PLUG, WASHER, NUT

Line Drawing illustrates the Shur-Lock Feature. Roll Pin Locks Stem Nut Preventing Unauthorized Removal or Adjustment. For Stops With This Feature, Specify Number 10693 or 10694.



10694

Gas Service Stop. Iron Body. Flat Way. Heavy Pattern. Flat Head Lock Wing, with Bronze Plug, Nut and Washer. With Shur-Lock Feature. Black or Galvanized.

Size Inches: ½, ¾, 1, 1¼, 1½, 2.

For information on the complete line of McDonald gas service stops, write for free catalog.

A. Y. McDONALD MFG. CO.
Dept. G-1159, 12th & Pine
DUBUQUE, IOWA

ONLY THE FINEST WATER HEATERS ARE PERFORMANCE RATED

...AND THEY'RE MADE BY AMERICAN-STANDARD

FINEST NAME IN PLUMBING AND HEATING

- With Performance Rating you easily match your customer's needs to the right size "rated" water heater.
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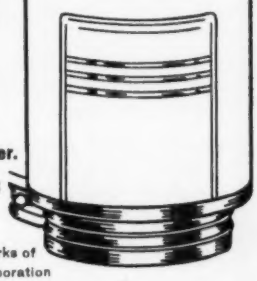
- Performance Rating means your customers won't run out of hot water.
- Glass-lined or galvanized steel tank; 20 to 65 gallons; full price range.



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PLUMBING AND HEATING DIVISION

AMERICAN®
insulated meter connections

permanent molded-on design simplifies assembly

- Insulation covers pilot flange and extends up the body—minimizes possibility of short circuits caused by moisture. No loose parts.
- Tough Nylon insulation seals tight, resists crushing. High dielectric strength eliminates electrolysis.
- Insulated meter connections are interchangeable with standard connections—accepts standard caps and washers. Reduces inventory problems.

Ask your American representative for Bulletin 308 describing all insulated and standard meter connections.

AMERICAN® METER COMPANY
INCORPORATED ESTABLISHED 1836

Executive Offices: Philadelphia 16, Pa.
Sales offices in principal cities.

Shreveport. HASKELL L. DICKINSON, Little Rock contractor and business man, succeeds Hardin to the post on the board of directors.

Bailey Meter Co., Cleveland, named B. E. GALLAGHER as resident engineer in Indianapolis, subdivision of the company's Chicago district.

Brig. Gen. JOSEPH M. COLBY, Deputy Commanding General, U. S. Army Ordnance Missile Command at Redstone Arsenal, Alabama, has been named vice president of engineering for Rockwell Manufacturing Co., Pittsburgh. He joined the company on Oct. 1, the date of his

J. M. Colby
Rockwell

retirement from the Army. C. A. WIKEN, vice president of research and engineering, now becomes vice president of research and development. This department will devote its energy toward creating or inventing new products to augment existing lines. General Colby will direct his department's efforts in the area of maintaining and improving existing products.

RUSSELL A. HEDDEN has been named works manager of manufacturing, Industries Group, at Allis-Chalmers' West Allis (Wis.) Works. He succeeds E. W. BONNESS, who has become consultant to the director of manufacturing, Industries Group.

WALTER G. GEORGE, export sales manager, power tools and municipal products, has been appointed manager of Rockwell Manufacturing Co.'s export department.

Consolidated Electrodynamics Corp., Pasadena, Calif., has set up a separate marketing organization for the Analytical & Control Instrument division. ROBERT D. ENOCHS is manager of the new operation, reporting to HAROLD F. WILEY, division director.

"W" Type Survey for downtown and commercial areas

The Safety Service That Saves Gas

includes street and building inspection. This Heath Leakage Control Survey accurately locates and classifies gas leakage. It reduces unaccounted for losses and gives the obvious advantage of a 3rd party Audit of your leakage situation.

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Write for information about a Heath Survey of your properties.

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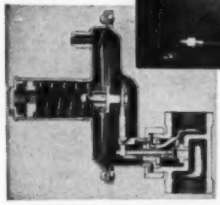
GAS SERVICE REGULATORS FOR CONVERSION OR PRESSURE ELEVATION

A REGULATOR, BREATHER VENT AND CATHODIC INSULATOR IN ONE PACKAGED UNIT



U. S. Patent No. 2,577,480. Other Patents Pending.

TYPE 51-R FOR EVERY INSTALLATION

EXCLUSIVE FEATURES NOT FOUND ELSEWHERE!

Exceptionally high relieving capacity obtained by new type internal relief valve. Remarkable by-pass check valve prevents over-shooting of low pressure and damage to meter.

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UNIVERSAL
CONTROLS CORPORATION
P. O. BOX 13122 WALNUT HILL STA.
DALLAS 20, TEXAS

H. GREVILLE SMITH, C.B.E., has been elected a director of Quebec Natural Gas Corp., Montreal.

HECTOR P. BONCHER has been named vice president-marketing of Dresser Industries Inc., Dallas. Boncher has been an operating vice president since 1955. Prior to that he was general manager of Dresser Manufacturing Division, one of the Dresser Industries. He joined the Bradford, Pa. division in 1929.

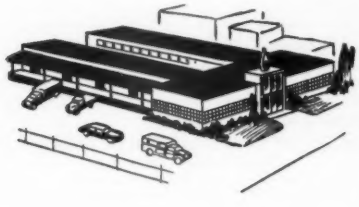
H. P. Boncher
Dresser

ROBERT F. DUEMLER has been named to the new post of vice president for employee and public relations of Columbia Gas System Service Corp., New York.

ELLSWORTH G. REYNOLDS, secretary of Michigan Consolidated Gas Co., Detroit, has been elected a vice president.

ERWIN C. BRENNER, vice president of the operations division of Milwaukee (Wis.) Gas Light Co., has been named senior vice president of the company. He has been with the company since 1920. ERNEST F. SEMRAD, assistant chief engineer of Michigan-Wisconsin Pipe Line Co. and American Louisiana Pipe Line Co., was named vice president of gas supply and distribution for Milwaukee Gas.

VIRGIL W. HALL has been named Wichita (Kan.) division manager of Consolidated Gas Utilities Corp. He succeeds C. D. REASOR, who is retiring. Hall has been Winfield division manager since 1937.



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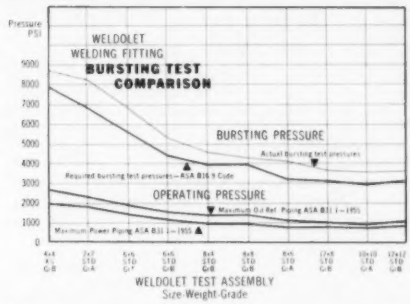
BONNEY WELDOLETS

for reinforced branch connections on carbon steel and alloy pipe

Welding fittings manufactured and tested in accordance with ASA B16.9 and ASA B31.1

clean-cut bevel with exactly 1/16" land
bore machined with a watchmaker's precision and finish
reduced angle of bevel ... weld volume cut almost 50%
weld line clearly defined ... no more errors about "how much to weld"
skirt taper redesigned for improved stress distribution

RESULTS? OVER 4½ TIMES MAXIMUM OPERATING PRESSURE



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WELDOLETS®
THREDOLETS®
SOCKOLETS®
ELBOLETS®
BRAZOLETS®
SWEEPOLETS®

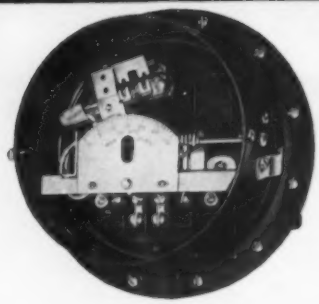
CARBON STEEL
STAINLESS
ALLOY
for all services

For high strength and low-total installed cost compare with . . . other reinforced branch construction . . . unreinforced branch construction . . . and welding tee construction. Then specify and use Weldolet fittings for all full size and reducing branch connections.

BONNEY FORGE AND TOOL WORKS

ALLENTOWN, PENNSYLVANIA

new instrument



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LOW PRESSURE DIAPHRAGM CONTROL

For Air or Gases

This FM approved (Mercoid Type PG) control can be used three different ways; for positive pressure; negative pressure (vacuum); for differential pressure or vacuum.

OPERATING RANGE 1.0″ to 30.0″ (H_2O)

FIXED DIFFERENTIAL (Sensitivity)
When operating point is set at

Low	Med.	High
0.6″	0.8″	1.0″

MAXIMUM PRESSURE 20 psig

Equipped with Fairprene diaphragm, external adjustments, hermetically sealed mercury switch—case made of heavy gauge steel (NEMA 1)

Available fully automatic or semi-automatic with manual reset.

Write for Bulletin PG to The Mercoid Corporation, 4231 Belmont Ave., Chicago 41.

FM APPROVED

HIGH TEMPERATURE LIMIT CONTROL

Mercoid Type MX-51R for use with dryers, ovens, furnaces, etc. This adjustable indicating type high temperature limit control is actuated by a coiled bimetal element to result in a normally closed mercury (tube type) switch opening in event the supervised temperature reaches the preset limit point. A manual reset knob is arranged to reset mercury switch after high temperature operation and normal temperature restoration.

Operating Range (adjustable) 50-650° F. Minimum Differential 20° F. Electrical Rating 10A. 115V. 5A. 230V.

Has independent adjustments for setting both high and low operating points; visible calibrated dial; sealed mercury contact, reversible mounting flange. Case made of heavy gauge steel (NEMA 1)

Write for Bulletin SEB-51 to The Mercoid Corporation, 4231 Belmont Avenue, Chicago 41, Illinois.

SPECIFY
MERCOID® CONTROLS

ROBERT S. BOLLIN is chief engineer of Toledo (Ohio) Pipe Threading Machine Co. Bollin joined the company earlier this year as assistant chief engineer.

FRANK P. KELLY has been appointed manager of manufacturing operations for the Philadelphia-based Brown Instruments Division of Minneapolis-Honeywell Regulator Co. He succeeds FRANK M. REA, who has been assigned to Honeywell's Industrial Products group as a consultant in industrial engineering, tooling, and subcontracting.

Walworth Co., New York, has appointed ROBERT F. SNOWDEN as a sales representative in the company's Gulf division. He will headquarter in Oklahoma City.

A. W. PEABODY has been appointed supervising engineer of the corrosion engineering group of Ebasco Services Inc., New York. Peabody has been with Ebasco for 22 years. Since 1939 he has concentrated on a wide variety of corrosion engineering products.

JOHN W. HAWLEY has joined Chemtrol, Lynwood, Calif., as manager of the product development department. His new duties include expansion of the company's present line of plastic valves as well as market research, design, and testing of related equipment.

MORRIS P. STILLINGER has been appointed national sales manager for Deutsch Controls Corp., Los Angeles. Stillinger formerly was sales administrator for General Controls Co.

W. THOMAS GETTIG is vice president and general manager of the LFM Manufacturing Co., Atchison, Kan. LFM is a wholly owned subsidiary of Rockwell Manufacturing Co. Gettig has been assistant to the vice president of Rockwell's meter and valve division.

JAMES A. SCOGGIN has been named to the newly created post of general service manager, construction machinery division, Allis-Chalmers Manufacturing Co., Milwaukee.

MARTIN J. WHITE, transmission and distribution engineer in the gas distribution department of Public Service Electric & Gas Co., Newark, N. J., has retired after more than 43 years with the company.

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use **TiteSeal®**

SEALING COMPOUNDS

Heat and vibration-proof, non-solvent, will not shrink, crack or crumble. Makes all assemblies leak-proof and pressure-tight. Prevents rust, corrosion, joint seizure.

7 BASIC BLENDS

LIQUID WRENCH®

The super-penetrating rust solvent

LOOSENS

rusted bolts, nuts, screws, 'frozen' parts

Liquid Wrench works *fast*...yet is absolutely safe for all metals and alloys.

2171

At Industrial, Automotive, Hardware, Plumbing Jobbers

SOLDER SEAL

RADIATOR SPECIALTY CO.
Charlotte, North Carolina

PROTECT
mains, meters,
pipes, equipment,
and appliances with

MAYCO

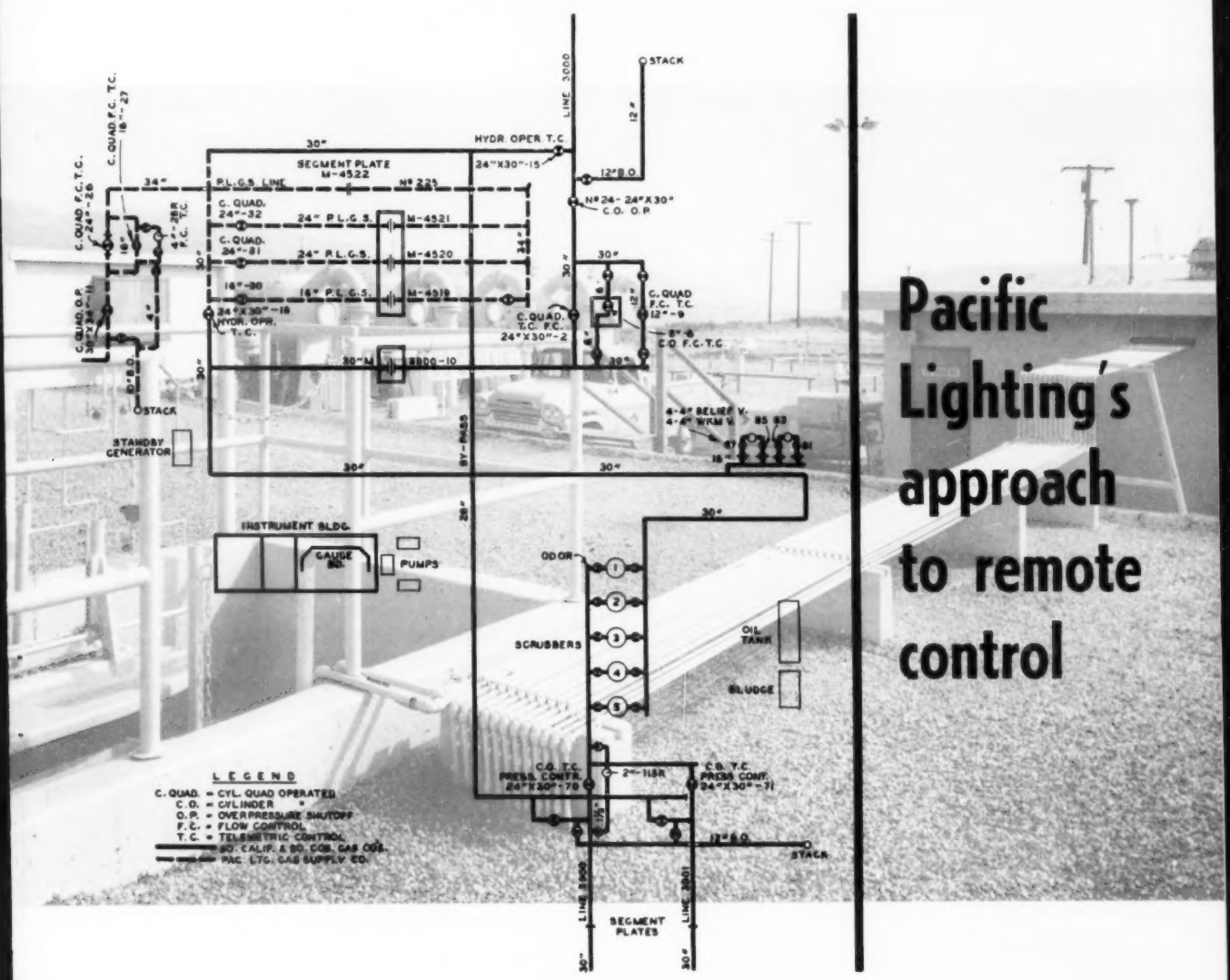
Dielectric Fittings or
Dielectric Bushings

Stop electrolysis by insulating connections with MAYCO Dielectric Fittings or Dielectric Bushings. Bushings are toughest PLASKON nylon with extra-heavy "hex" gripping surface (on most sizes)...withstand pressures to 1000 lbs., temperatures to 300° F. Sizes to 2" for gas, plumbing, heating installations—wherever dissimilar metals are joined. Order from your jobber or write:

MAY PRODUCTS, INC.
GALESBURG, ILLINOIS
Manufacturers of MAYCO Dielectric Fittings – MAYCO Water Softeners

GAS

PIPELINE SECTION



Pacific Lighting's approach to remote control

You're Money Ahead to

MEASURE PIPE PROTECTION WITH A CALENDAR

How should pipe protection be measured? By first cost? By ease of application? By appearance?

With all the claims made for protective tapes, too often the most important consideration is overlooked—the simple point of how long and how well it will protect the pipe.

Since 1941, when TAPECOAT originated coal tar coating in tape form, this protection has proved to be the best that money can buy for combatting corrosion underground or under water. Lines in service, TAPECOATED as far back as 17 years ago, show no signs of deterioration —a record of uninterrupted performance *no other type of tape can match*. Think what this means in terms of preventive maintenance and elimination of replacement costs!

After all, hot-applied coal tar has proven over the years to be the most dependable and enduring protection. And because TAPECOAT is a hot-applied coal tar coating in tape form, it offers the same lasting protection.

A TAPECOAT sales and service engineer is available at all times to assist you on any corrosion problem and on the various applications of TAPECOAT.

Write for complete details today.

PROVED IN SERVICE

...Underground or Under Water on

Pipe	**Tanks**
Pipe Joints	**Tie Rods**
Service Connections	**Conduit**
Mechanical Couplings	**Cables**
Fittings	**Splices**
Insulated Lines	**Bridge Crossings**

TAPECOAT comes in rolls of 2", 3", 4", 6", 18" and 24" widths—sized to the job. Available also in asphalt. Where primer is desired, specify TC Primecoat, the compatible coal tar primer.

TAPECOAT®
A PROTECTIVE COATING

The **TAPECOAT** *Company*

1535 Lyons Street, Evanston, Illinois

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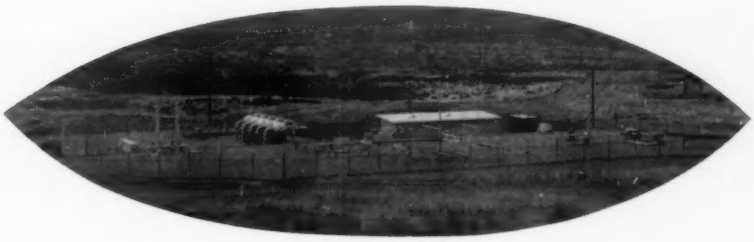

PART 2

QUIGLEY STATION

A Pacific Lighting System approach to

REMOTE CONTROL

PLGS facilities at Quigley

By H. L. CLARK, Staff Assistant • Pacific Lighting Gas Supply Co., Los Angeles

PACIFIC LIGHTING GAS SUPPLY CO.'S facilities at Quigley station measure and control gas into and out of a 34-in., 750-psig natural gas pipeline. It extends from Quigley, the southern terminus, through the Angeles National Forest and the mountainous terrain of the Tehachapis to the southern section of the San Joaquin valley. (An article covering this 81.5-mile pipeline appeared in the February 1959 issue of GAS Magazine, page 122.) The function of the 34-in. line, which dictated the design of our section of Quigley station, is threefold:

1. *It serves* as a means of transporting high pressure gas from the San Joaquin valley to the Los Angeles Metropolitan area.
2. *It is used* to help equate the gas supply and the peak hourly loads in the Los Angeles area, and therefore is, in effect, a long, high-pressure gas holder.
3. *It is designed* so that perhaps eventually out-of-state gas from the 30-in. Needles pipeline might be delivered to possible future storage fields in the San Joaquin valley when these are developed.

• Design requirements

After looking at the problem, it was decided that Pacific Lighting Gas Supply Co.'s Quigley measurement and control station would have to fulfill the following requirements:

1. Have a maximum working pressure equal to that of the 30-in. Needles line, i.e., 936 psig.
2. Be capable of measuring a minimum of 0.5

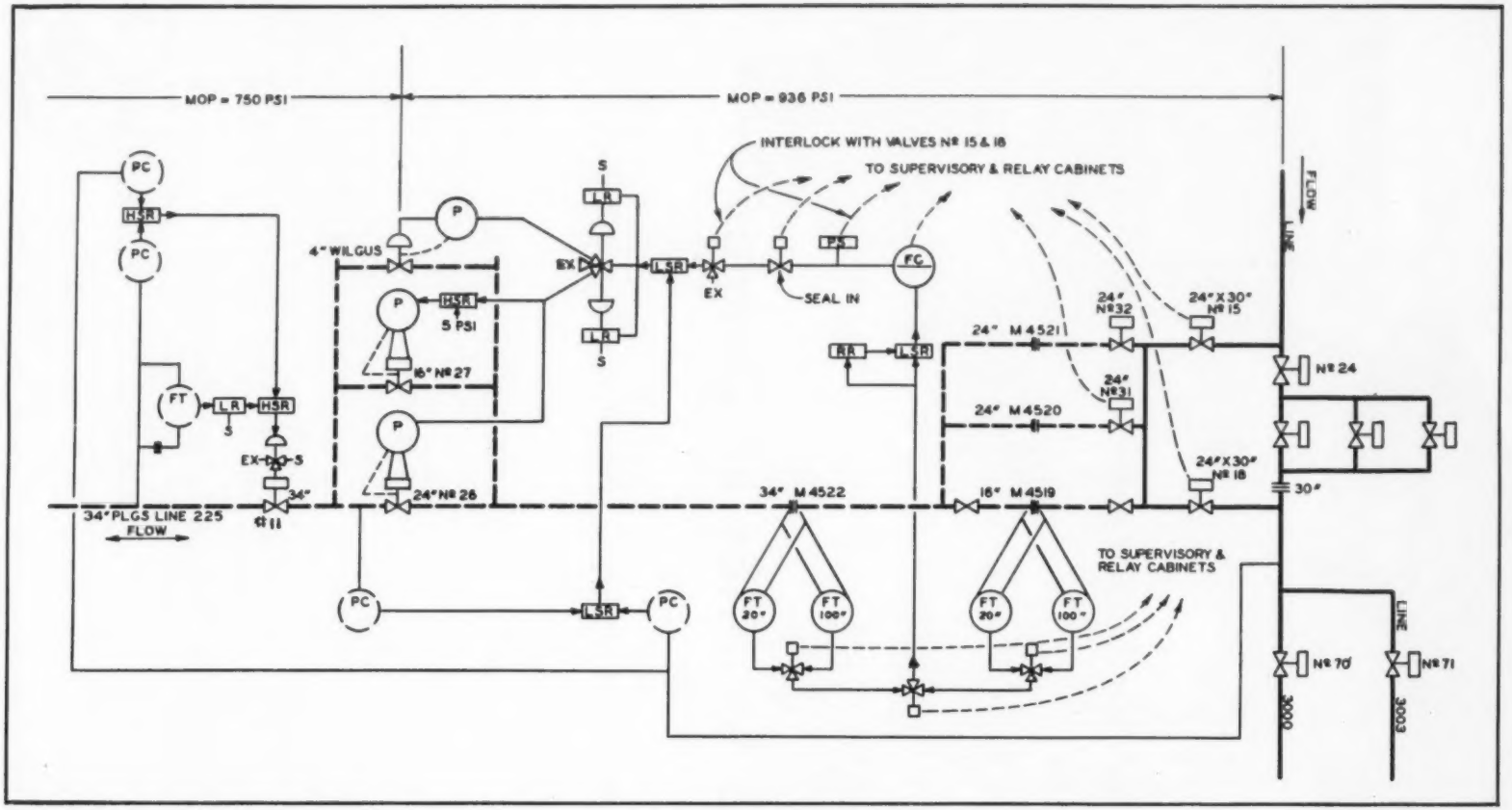

Fig. 10. Schematic diagram of Pacific Lighting Gas Supply Co.'s control functions at Quigley station.

MMcf per hr @ 450 psig, and a maximum of 30 MMcf per hr @ 300 psig on south flow (a rangeability of 60-1 irrespective of pressure variation).

3. Be capable of measuring an undetermined amount of gas on north flow, at pressures up to 900 psig (probably not to exceed 8 MMcf per hr).
4. Be capable of flow controlling the above volumes with the maximum pressure conditions of
   P_1 = 750 psig and P_2 = 300 psig on south flow and
   P_1 = 900 psig and P_2 = 500 psig on north flow.
5. Have provisions for high downstream pressure overrides on the modulating control valves in both directions.
6. Have secondary override controls with manual reset that would close block valve #11 in the event of abnormally high downstream pressures on either north or south flow.
7. Have automatic line break controls that will close block valve #11 in case of pipeline outage or a rupture of station piping.
8. Have provision for effecting flow controller set point changes from Southern California Gas Co.'s operating base in Newhall.
9. Finally, the control valves should not impose more than a 3 or 4 pound pressure drop during a maximum through-put flow operation (volume estimated @ 27 MMcf per hr).

After reviewing the design requirements, the aforementioned area name (referred to previously) of "Confusion Hill" seemed somewhat appropriate for this station also.

Our phase of the station piping, the measurement design, and the basic control design were developed by Pacific Lighting Gas Supply Co. The latter was then turned over to the design department of the Southern California Gas Co. for review and integration into the overall station control design. What resulted did not come up to the feared "confusion" level, so "Quigley" prevailed. (*See Figs. 2 (on page 60) and 10*).

• Measurement

The basic measurement elements selected were one 16-in. and two 24-in. orifice meter runs (M-4519, M-4520 and M-4521) all equipped with Daniel Senior orifice fittings *(Fig. 11)*. A segmental plate (M-4522), from which a composite flow rate might be obtained for purposes of telemetering and flow controlling high rates, was installed in the 34-in. line that connects the control valves and the meter tube header. A 0.5-in. thick stainless steel plate, fabricated by the Daniel Orifice Fitting Co., was welded into the 34-in. line and covers approximately the top 50 per cent of the inside area. Flange taps were placed at 3:00 o'clock (edge taps) and at 12:00 o'clock (top taps). We have found that the edge taps yield a little less differential pressure than the top taps, but since the plate size was calculated for edge taps, and the differential pressure at the lower flows is adequate, the edge taps are being used.

In order to cover the complete flow range adequately for telemetering and flow control, both the 16-in. meter run and the 34-in. segmental plate were equipped with 100-0-100-in. and 20-0-20-in. Moore-Barton differential pressure pneumatic transmitters with 3-15 psi output. The overall ranges of these transmitters are 200-in. H_2O and 40-in. H_2O respectively. Half of the range in each case is used for one direction of flow and the other half for the other direction of flow. Therefore, zero flow is represented by a 9 psi output. The dispatchers at Newhall can select remotely the meter run size and transmitter range necessary to handle the desired flow. The 3-15 psi pneumatic output signal is received by bellows type sensing units in the remote set Bristol flow controller and the Bristol pulse-duration type telemeter transmitter. This telemeter transmitter and its asso-

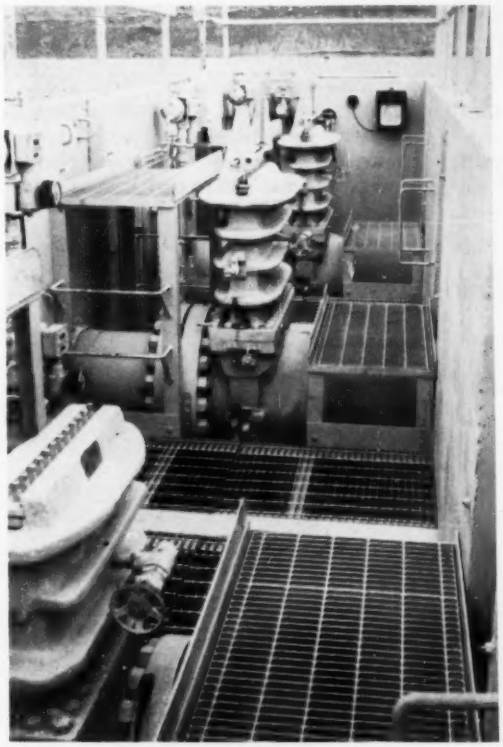

Fig. 11. Looking north in meter pit containing one 16-in. and two 24-in. senior orifice fittings. Differential pneumatic transmitters are on wall at left.

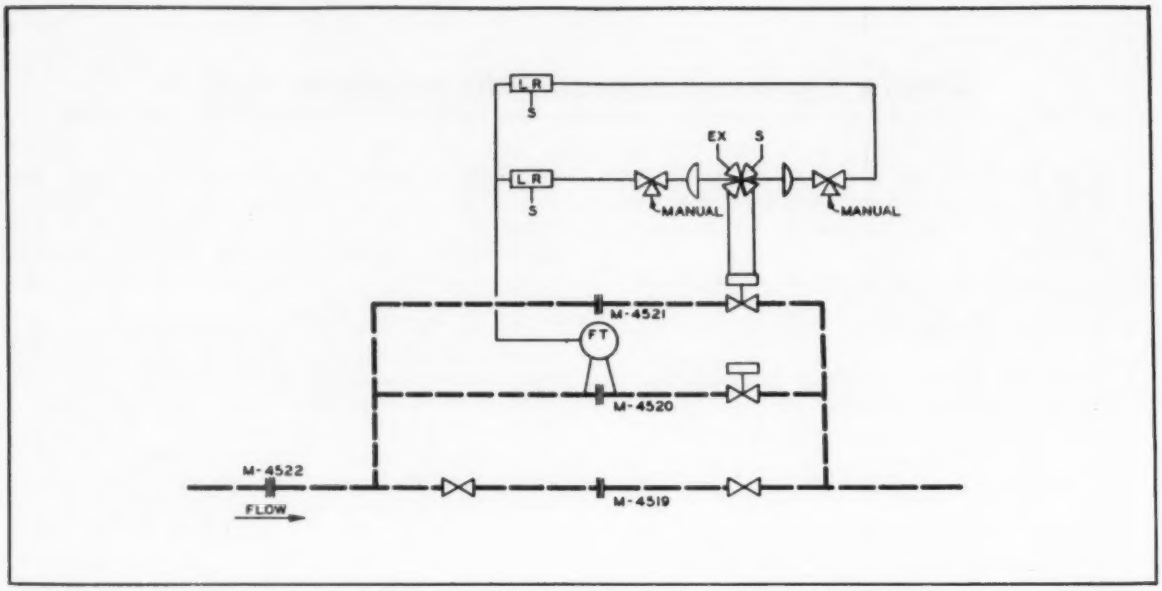

Fig. 12. Schematic of controls to open or close orifice Meter M-4521.

ciated receiver at Newhall have 10-0-10-in. square root charts, thus the direction of flow is automatically taken care of and is always shown.

The rangeability required for official measurement is achieved by opening the 24-in. meter runs in sequence as they are needed, while the 16-in. tube is kept in continuous service. The first 24-in. run is brought in when the control function is switched from the 16-in. tube to the 34-in. segmental plate. The same remotely keyed signal that switches the differential transmitters momentarily energizes a 3-way solenoid valve, which, in turn, sends a momentary 20 psi pneumatic signal that positions a double-diaphragm type, 4-way valve which opens the Ledeen Quad-actuated 24-in. Rockwell-Nordstrom plug valve (#31). This run is closed in a similar manner when the control function is switched back to the 16-in. tube. The sequencing of the second 24-in. run is accomplished by the use of two Moore products snap-acting limit relays, one direct and one reverse acting, that monitor the output of a 100-in. differential transmitter on the first 24-in. meter run. (See *Fig. 12.*) The direct acting relay snaps when the differential reaches 72-in. H_2O across the plate of the first 24-in. run. Its 20 psi output shifts a double diaphragm 4-way valve that directs 200 psi gas into the proper

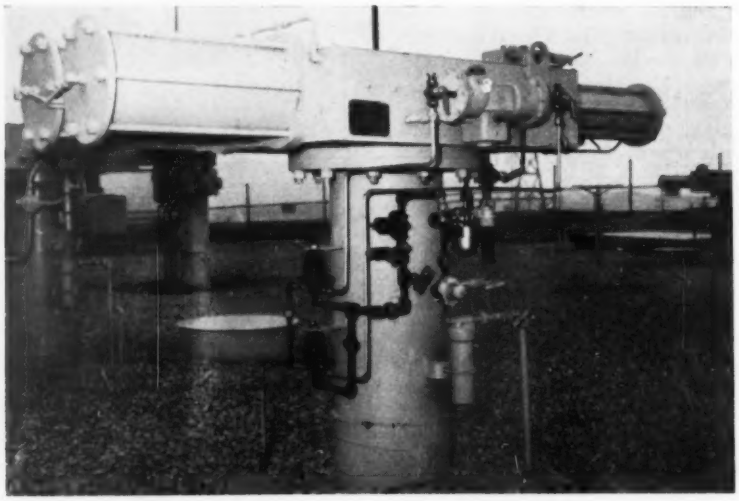

Fig. 13. Meter run sequencing controls on cylinder-actuated plug valve on second 24-in. meter run.

cylinders of a Ledeen Quad Actuator, thus opening the 14-in. plug valve on the second meter run. The reverse-acting relay drops out the second 24-in. run when the differential reduces to 16-in. H_2O in the first 24-in. run. The manually operated 3-way valves block the automatic signals and exhaust the diaphragms of the 4-way valve when manual operation is desired *(Fig. 13)*.

Official measurement is recorded on 30-in. H_2O and 100-in. H_2O range Barton bellows type differential recording gauges equipped with 1000 psia S.S. static elements and 48-hr rotation electric chart drives. The gauges, which are located on the gauge board in the building, are connected to the orifice fittings with pairs of 0.5-in. diameter static lines ranging in length from 70 to 100 ft.

• Control

Modulating plug valves were chosen to do the majority of the controlling chore. Two Rockwell-Nordstrom Hyperseal plugs, one 16-in. and one 24-in. (Nos. 27 and 26) are sequenced, with the 16-in. carrying the lion's share of the load. The 24-in. will not come into play until the pressure drop across the valves is down to about 20 psi. Around the 16-in. plug is a 4-in. Wilgus diaphragm control valve that handles the low flow-high pressure drop conditions. Volumes up to 4 MMcf per hr, at critical pressure drops, can be handled by this valve, which is equipped with a hydraulic dash pot and a Moore products valve positioner for stability and versatility. A controller output of 3-9 psi through the positioner produces a full stroke. Ledeen Manufacturing Co. quad type cylinder actuators provide the motive force to the two modulating plug valves. Foxboro Poweractor positioners receive the incoming 3-15 psig flow controller signal, positioning the valves accordingly. The heart of the Poweractor positioner is an integral, spool-type 4-way valve that directs 150 psig gas to the proper ends of the actuator cylinders. Valve position is sensed by a feedback spring. The Ledeen Quad actuators feature four cylinder-encased double-acting pistons and separate gas and oil circuits. The 150-lb gas acts on the larger pistons to provide the "push." Oil moves back and forth between the smaller

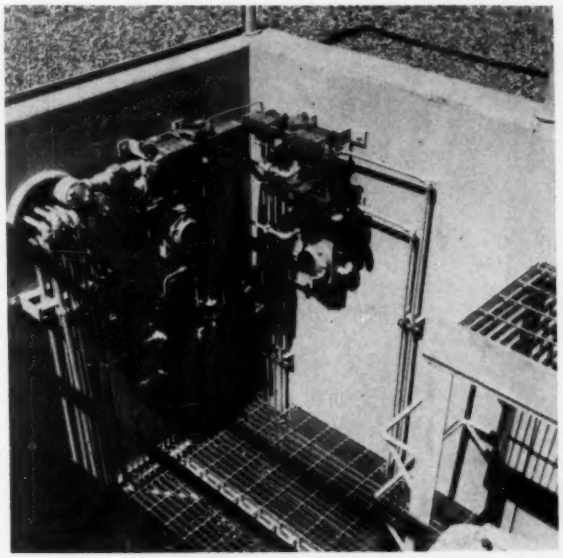

Fig. 14. Corner of meter pit showing remotely actuated 3-way valve control signal selectors and gauge lines.

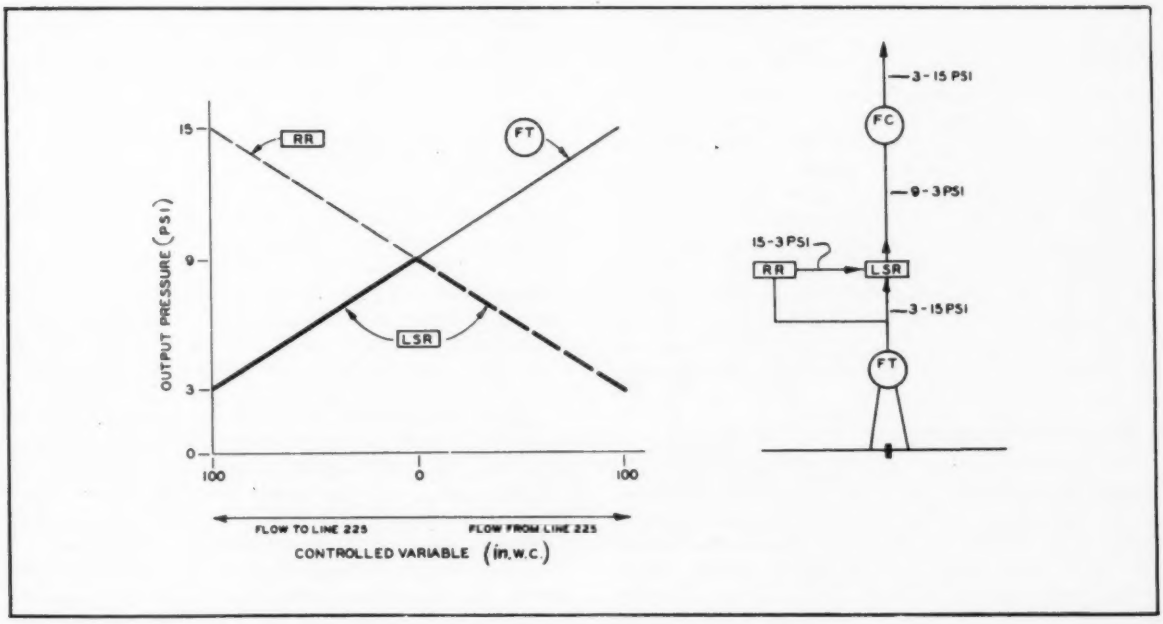

Fig. 15. Two-way flow control for meters M-4519 and M-4522.

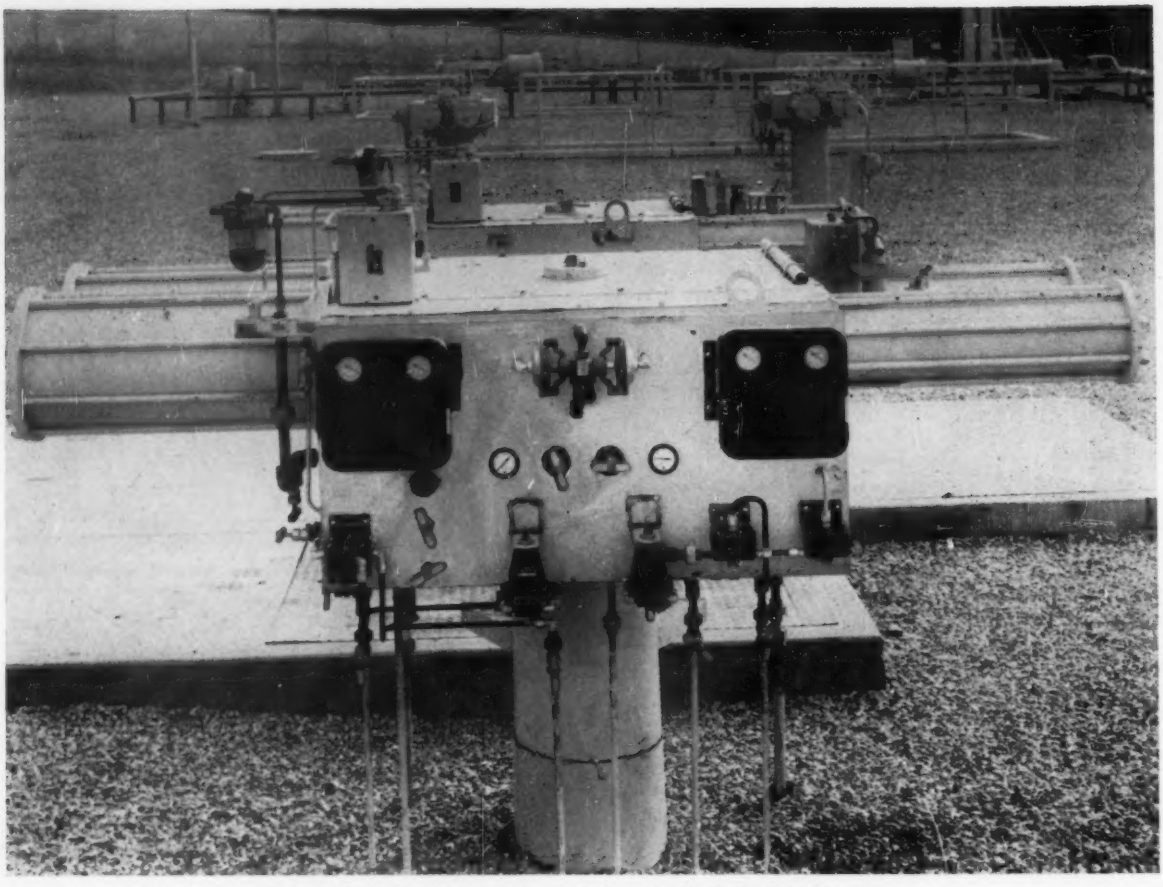

Fig. 16. Control panel mounted on cylinder actuator for buried 24-in. regulating block valve. Actuator for 16-in. regulating plug valve is behind.

cylinders at the other end of the actuator. In this hydraulic circuit, a hand pump and 4-way valve with bypass, provide a means for manual operation. Speed control, so necessary for smooth regulation, is accomplished by the use of two unidirectional restrictor valves also in the hydraulic circuit.

It was believed desirable to have the full load of the 4-in. diaphragm control valve shifted over to the 16-in. plug valve when the 4-in. could no longer pass the required amount. This was accomplished by the use of two Moore Products high-gain (snap acting) limit relays that monitor the output of the flow controller. But then, let's start at the orifice plates and follow the flow control circuit all the way through.

• Flow control circuit

The 20 and 100-in. differential transmitters on meters 4522 (34-in.) and 4519 (16-in.) are shown at the bottom center of *Fig. 10*. As indicated, a remote signal from Southern California Gas Co.'s Newhall operating base positions two Ledeen 3-way, double bellophragm valves, equipped with explosion proof solenoid valves, that select the output of either the 100-0-100-in. range or the 20-0-20-in. range transmitters from both meter runs. The next remote signal selects which meter tube will provide, to the control circuit, the previously selected differential range transmitter output. In this manner, either range on either meter run can be selected *(Fig. 14)*. This selected pneumatic signal is taken directly to the 10-0-10 square root telemeter transmitter (not shown in *Fig. 10*). The remote set flow controller could not accept this signal straight; however, because of the 2-way flow feature of the differential transmitters, i.e., as the south flow from Line 225 increases from 0 to 100 in., the transmitter output increases from 9 to 15 psig. And as the north flow to Line 225 increases from 0 to 100 in., the transmitter output decreases from 9 to 3 psig. We, therefore, have one direct signal and one reverse signal, a situation that would confuse a controller no end. To correct this, the "FT" signal is split and fed to a low selector relay, one leg direct and the other going through a Moore Products M/F Reversing Relay. The net result is that the flow controller always sees a 9-3 lb reverse signal regardless of the direction of the flow. *Fig. 15* shows graphically the direct and reversed signals crossing at the 9 psig transmitter output (zero flow condition) with the low selector relay

always passing the lower of the two signals, as indicated by the heavy lines. The Bristol flow controller, which incorporates both proportional band and reset, was then set up as a reverse acting controller, providing the required 3-15 psig output with the 9-3 psig input.

Let's continue on our journey around the control circuit. The flow controller (hereafter referred to as the "FC") output is monitored by a pressure switch that disallows any remote operation of station valves Nos. 15 and 18 until the FC output drops below 3 psig and therefore, all of the control valves (Nos. 26, 27 and the 4-in. Wilgus) are closed. The next item encountered is a 2-way solenoid that seals in the FC signal to the control valves when remote changes are being made to the FC set point, or when a different meter run or differential range is being selected. It takes a change, or a reaffirmation of the existing status, of all three controllables each time before the station will unseal. Next is a 3-way solenoid that, when energized, blocks any FC output and exhausts the control line to the control valves. This solenoid is energized automatically when both station valves Nos. 15 and 18 are closed.

We now come to our high pressure override controls. (See *Fig. 16.*) If you follow the input line down from the low selector relay (LSR), you will find another low selector relay which accepts the output of the two pressure controllers. The two Fisher 4150 Wizard II controllers are set for reverse action. One senses Line 225 pressure and the other senses the intermediate pressure in Quigley station. As the pressure at either of these points goes above the maximum working pressure, the output of that particular pressure controller starts dropping below 15 psi. The Moore Products Type 61F low selector relay has the ability to select and pass the lower of the two input signals. The output of this LSR then becomes one of the input signals to the next LSR. Since the FC signal is the other input to this low

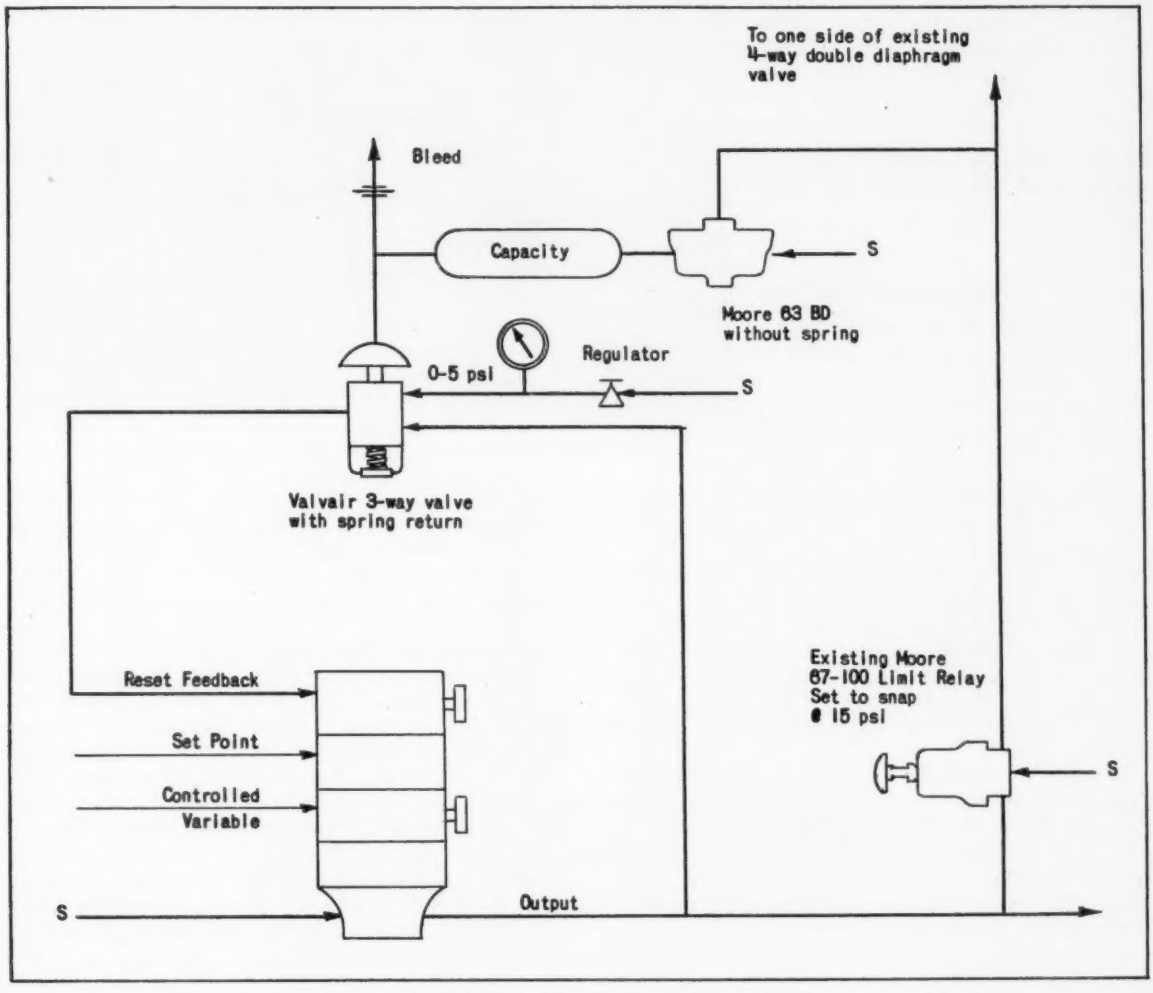

Fig. 17. Reset chamber unloading circuit designed to solve two basic problems encountered in the control system.

selector relay, it can readily be seen that either pressure controller can override the flow controller with a lower signal which tends to close the control valves.

The controls that transfer the control function from the 4-in. Wilgus to the 16 and 24-in. plug valves is encountered next *(Fig. 16)*. The double diaphragm valve shown is a Valvair 4-way valve with end exhausts. It is actuated by Moore products type 67-100 and 67R100 high gain (snap acting) limit relays that monitor the incoming FC or PC signal. You will no doubt recognize that this is the same as the control setup that sequences the second 24-in. meter tube. The direct acting 67-100 relay snaps at 9 psi, shifting the control signal to the valve positioners on 16- and 24-in. plug valves which are set for 3-9 and 9-15 psi split range. At the same time, the control line to the positioner on the 4-in. Wilgus is exhausted, thus closing the valve. The reverse of this happens when the incoming control signal drops to 4 psi. Because the first 28 per cent of the 16-in. plug valve travel is dead area, the valve is closed at 5.5 psig. The dispatchers must therefore drop the set point to zero, when reducing rates, in order to get the control function back on the 4-in. control valve. The high selector relay shown in the control line to the 16-in. plug maintains a minimum of 5 psi to the positioner at all times. This keeps the valve practically at the opening point, which eliminates the time lost while it moves through the dead area.

It might be worth noting that, on test, the 16-in. plug did an admirable job of controlling even on the lowest of flows. Wire drawing and cutting then appear to be the only possible drawbacks for this type of service. The station has been in service just a little over a year, and, as yet, we have not inspected the condition of the plug. However, a similar type 6-in. regulating plug valve that had controlled flows from 0.5 to 4 MMcfh at a mean pressure drop of 180 psig was inspected recently. Its plug evidenced little or no wear after one year's service.

We have experienced two difficulties in our control system during our first year of operation. One is the tendency of the 16-in. to overshoot at the time of switchover. This is caused by two things; (1) the slow speed at which the plug travels, and, (2) once the flow reaches the set volume, the slow lowering of the FC output (from 9 to approximately 6 psi) due to wide proportional band and slow reset adjustments. However, on such a fast-moving controlled variable as flow, these causitive conditions are required for stability of control once the set point has been reached.

The other problem is one of instability, which is characterized by a slow cycle, when the 4-in. diaphragm control valve is receiving its signal from the 20-in. range transmitter on the 16-in. meter run. A review of the equipment and control circuit exposes our problem here. First, the 20-in. range transmitter is inherently sensitive. Next, an input of 3-9 psi to the 4-in. control valve positioner strokes the valve fully. Only half of the controller output is being applied; therefore, only half of the selected proportional band is being used. The active proportional band is again cut in half when the valve is operating in the upper half of its operating range, which is the usual situation. This is due to the valve having an equal percentage inner valve, which means that the last 25 per cent of stem travel delivers 50 per cent of its flow capacity. The net result is that we are operating on approximately 25 per cent of the selected proportional band. It would seem logical then, to widen the band four times as wide as at present, but since we are already operating with a 100 per cent band, this would be impractical and cause us trouble in other phases of the overall control picture. We do intend to install a linear inner valve which will help us by spreading the proportional band evenly over the entire stroke of the valve.

A solution to the two basic problems has, we feel, been adequately worked out. We have not had a chance to install and therefore fully evaluate this

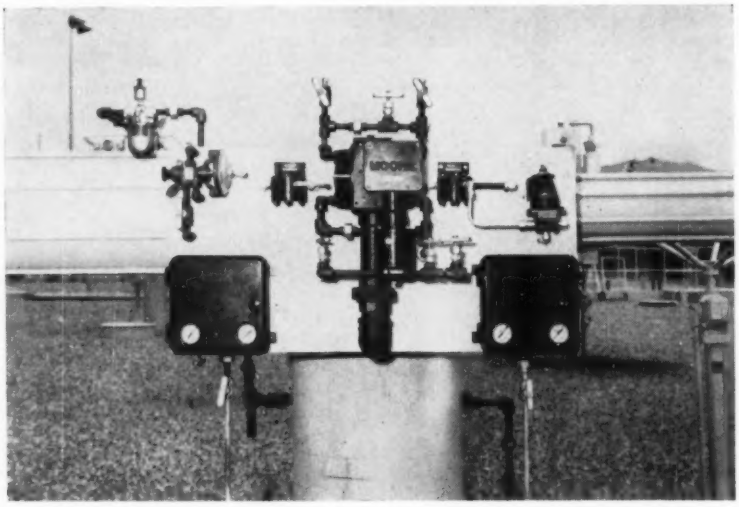

Fig. 18. Control panel mounted on cylinder actuator for buried 34-in. line block valve No. 11.

revision to the control system, but preliminary tests make it appear to be workable. To obtain optimum smoothness in our control, the 4-in. diaphragm control valve should reach full stroke at 15 psi, and, when the control function is switched to the 16-in. plug, the controller output should decay quickly enough to be down around the 6-lb control point area of the 16-in. plug valve by the time it has opened to its control position. This can be done by the use of the control system shown in *Fig. 17*, which provides for the immediate reduction of the pressure in the reset chamber at switchover time. This results in the controller output dropping at a relatively rapid rate. As the plug reaches control position and the controller output pressure has dropped to the approximate control level, the regular reset feedback is reinstated and normal control is resumed.

We propose then, to convert the existing remote set Bristol controller into a remote set setpoint transmitter, the output of which would be received by a Moore Products or Bristol stacked controller. The addition of this type controller is required because its construction makes possible external access into the reset feedback circuit. The actuation of the 3-way spring return Valvair valve and the timing, which is the critical phase of the operation, is accomplished by splitting the output signal of the existing 67-100 snap acting limit relay that shifts the existing 4-way valve (and hence the control function to the 16-in. valve) and applying it to the diaphragm of a Moore 63BD relay with the upper spring removed. This relay, which acts like a 2-way diaphragm control valve, pressurizes a capacity chamber and the diaphragm head of the 3-way Valvair valve, causing the valve to shift. This 3-way valve bleeds down the 15 psi pressure in the reset chamber to some preset pressure, as set by the small supply regulator, or even to atmosphere where fastest action is desired. The resulting decrease in controller output pressure drops out the signal from the 67-100 snap-acting relay which in turn closes the 63BD 2-way valve relay, trapping 20 psi pressure in the capacity chamber and the diaphragm head of the 3-way valve. The rate of bleed from the capacity system determines the length of time that the lower preselected pressure is held in the reset chamber and at what point the spring return shifts the 3-way valve back to normal position, returning the controller to automatic control.

• Controls on block valve No. 11

The panel mounted on the 34-in. line block valve (No. 11) holds the secondary high pressure shutdown controls and the automatic line break shutdown controls *(Fig. 18)*. As represented at the far left in *Fig. 10*, there are two snap-acting Fisher Wizard controllers, one sensing the pressure on Line 225, and the other, the intermediate station pressure. Either will put out a 20-lb signal in the event their respective monitored pressures exceed their settings, which are somewhat higher than the settings of the high pressure override controllers on the regulating valves. The two Wizard outputs are fed to a Moore Products high selector relay. The output of this HSR then becomes one of the inputs to another HSR. The other input to the second HSR comes the linebreak shutdown controls, which utilizes a Moore-Barton differential pressure transmitter with a restriction in the highside manifold piping. If the pressure in Line 225 should drop rapidly, as in the case of a line break, the pressure in the high side chamber would bleed off more slowly and, therefore, create a differential across the bellows unit. The resulting transmitter output is monitored by a 67-100 snap-acting relay which is set to snap at a preselected pressure. The 67-100 output then becomes the second input to the second high selector relay. Any output then of the Wizards or of the 67-100 relay will shift a single diaphragm 3-way valve, which supplies pressure to a hand set 4-way valve, thus closing the 34-in. cylinder actuated plug valve No. 11. Manual resetting of the 4-way valve is required in order to reopen this valve. This completes our tour of the control circuits. ■

EDITOR'S CONCLUSION

● And, this completes our whole tour of the Quigley station as well. Certainly, this is a work for gas engineers and control people in general to study at some length. It is a prime example of the use of rather sophisticated (actually, fascinating) instrumentation for practical gas property operating purposes.

As is the case with most complicated highly designed control systems, those at Quigley have produced some problems. But these have been rather few, we think, in relation to the volume and complexity of controls and functions. In fact, we are sure that after reading you will agree with the authors' statement that: "It is not the largest station in the system supplying out-of-state gas to southern California, but it is certainly the most complex. . . ."

We feel the involved companies and personnel should be congratulated. Quigley is in and operating, and is performing its designed tasks, unattended, in a routine manner.

The authors, Don Anderson, Southern California Gas Co. and Herb Clark, Pacific Lighting Gas Supply Co. both deserve further congratulations. Also, J. M. Lange, regulation and instrument engineer, Southern California Gas Co. contributed design to the station and helped immeasurably in the preparation of this article. The authors wish to thank Marv Lange for his valuable aid—just as we thank all three for making this article available to GAS' readers.

J. F. E.

COLD-EXPANDED PIPE

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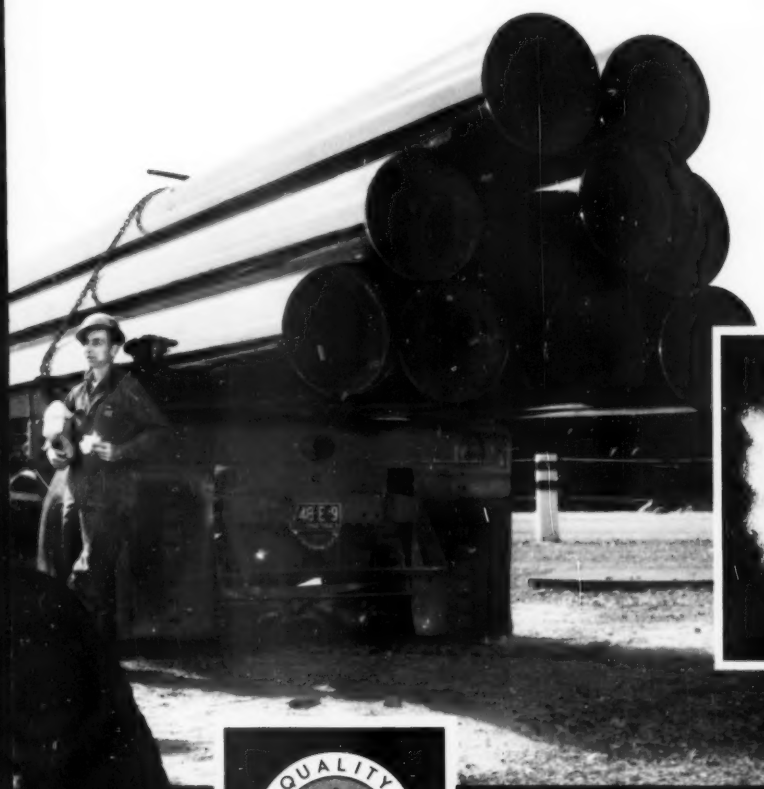
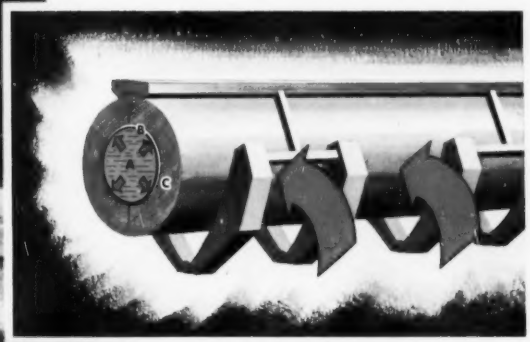
Remember, Youngstown Electric Weld Line Pipe is hydrostatically expanded to uniform roundness. In this operation (see below), internal water pressure (A) forces the pipe (B) outward against the solid walls of a mantle (C). Cold-expansion provides a lighter, stronger pipe for carrying higher line pressures. As a result of this process, cold-expanded line pipe has increased field weldability.

For particulars about Youngstown Electric Weld Line Pipe, contact our sales and field engineering offices strategically located throughout the oil and gas-producing country. The Youngstown Sheet & Tube Company, Youngstown 1, Ohio.





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Spanning The Narrows

By M. ANUSKIEWICZ JR., Assistant Chief Engineer
Brooklyn (N. Y.) Union Gas Co.

IN spanning The Narrows of New York Harbor with a dual line, the Brooklyn Union Gas Co. has installed one of the outstanding underwater pipeline crossings of the year.

In all, four lines have been pulled across the waterway in a common trench—two 24-in. natural gas mains by Brooklyn Union and two 24-in. oil products lines by Narrows Crossing Inc.

Together with the 8-mile 30-in. Clove Lakes line across Staten Island, the new installation provides the first major connection between the New York Metropolitan area and the Texas Eastern Transmission Corp. pipeline system. A capacity of up to 400 MMcfd is planned.

The lines cross the Narrows from New Lane on Staten Island to 91st Street in Brooklyn—an underwater crossing of 6200 ft. In going under the world's busiest waterway, no interference with marine traffic could be tolerated. Irregular tidal effects and currents added to the problems.

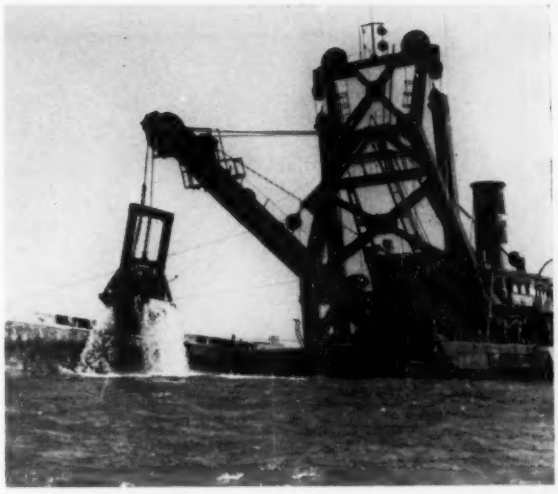
As the crossing passes through the anchorage area of the New York Quarantine Station, patrol boats continually cruised to warn incoming ships not to drop anchors on the lines prior to the backfilling of the trench. Cooperation of the pilots in the harbor was a great help, although many ships enter the port without a pilot.

The first phase of the project got underway early in February when dredging of the trench was started. By the end of June over 350,000 cu yd of material had

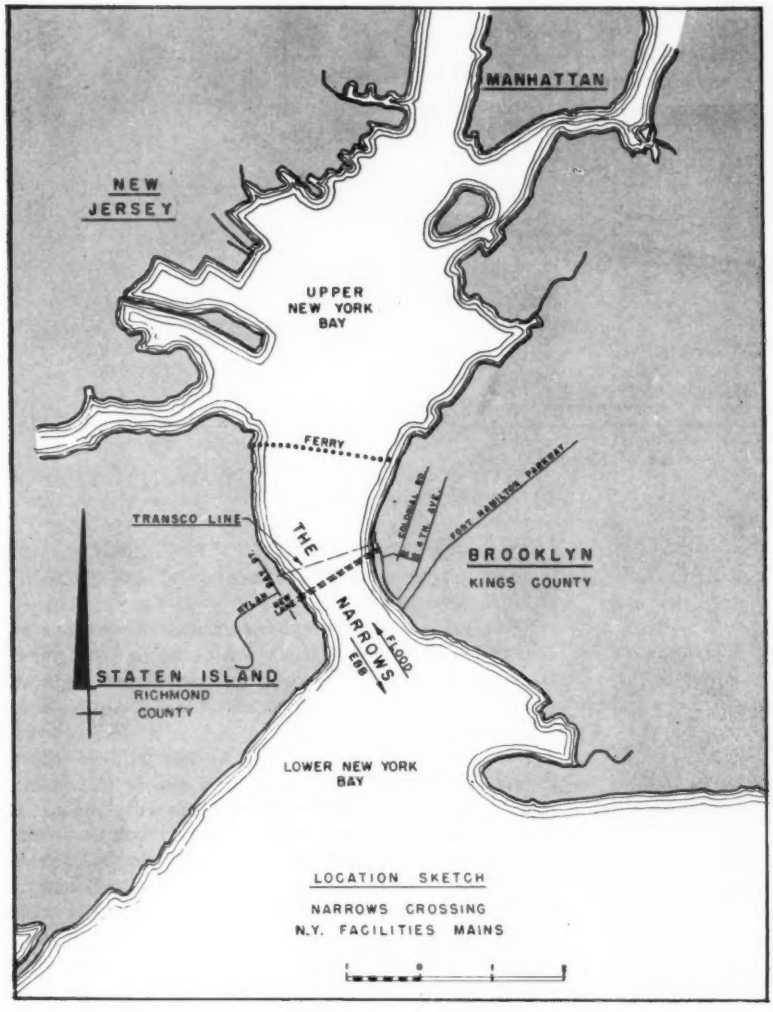
been removed. A trench 25 ft wide at the bottom and 20 ft deep was provided. The deepest point of the trench was 95 ft below the water's surface. Scows transported the spoil to offshore locations. Round-the-clock dredging operation required many special provisions such as warning lights, fog signals and sets of range lights provided on shore as guides for centerline location and as distance markers. A fathometer was used to check the depth of dredging and to confirm the proper location of the trench.

Considerable shore preparation was necessary, particularly on the Staten Island side. There a large bluff had to be removed to provide a launching area. Fortunately, several parcels of adjacent Staten Island property were also available for use as a pipe make-up area. On the Brooklyn Shore limited space was available as a working area, due to the proximity of the Shore Parkway. Thirty-inch casings were driven under this roadway to carry the 24-in. line to valve pits.

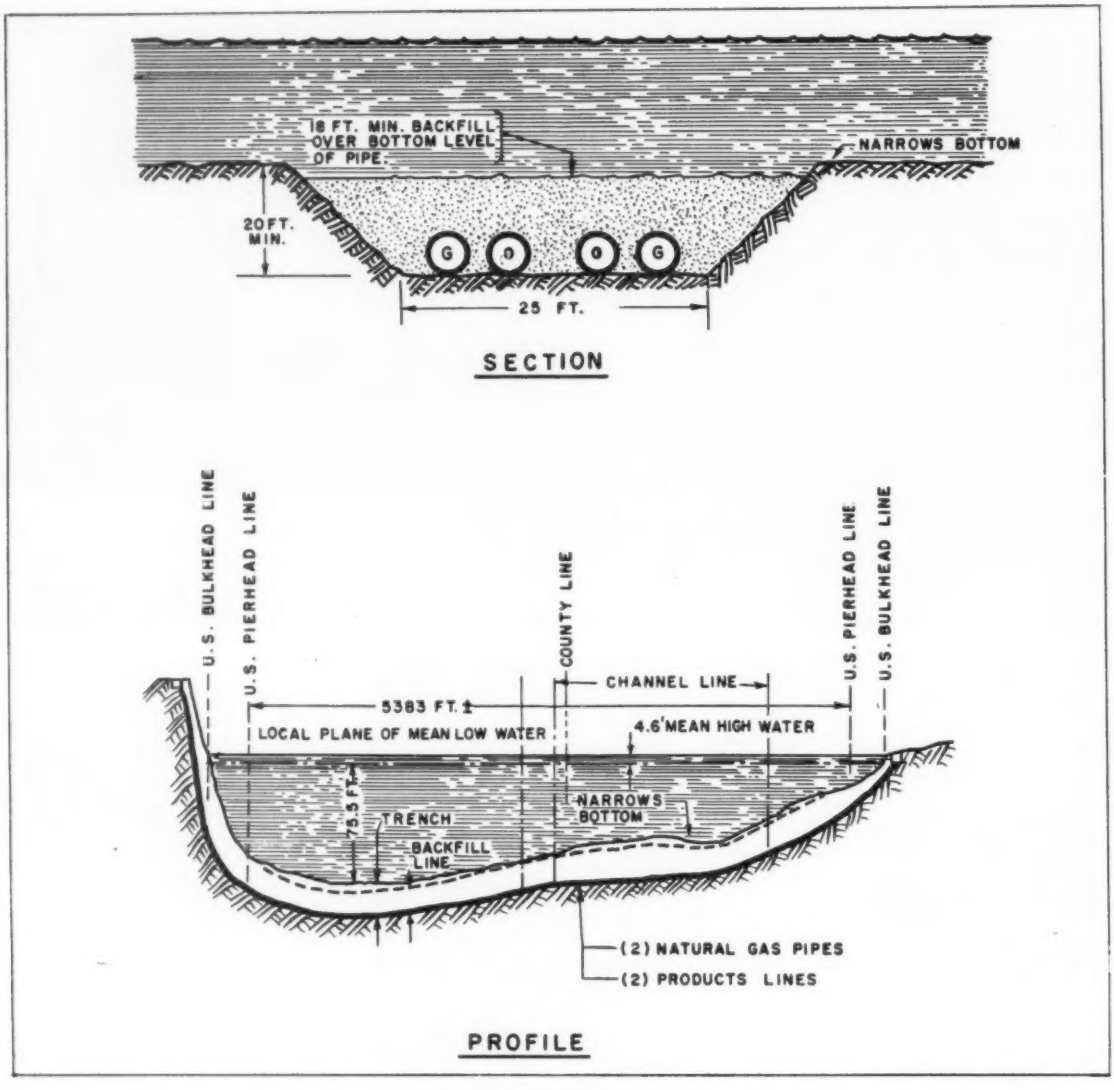
While the dredging proceeded the properties were



Dredging of trench.



At right: Location sketch of Narrows Crossing.



Views of Narrows' trench.

graded, racks were set up for pipe storage, and assembly of the pipe by welding into 500 ft strings was started.

Pipe for the crossing was ½-in. wall API 5 LX-42 seamless, averaging 40-ft lengths. A triple enamel and fibre glass wrap was applied. This was covered with asbestos felt. Heavicote concrete, averaging 190 lb per cu ft was then put on 2¾ in. thick. All field welds were X-rayed, wrapped and also concrete coated.

Prior to launching, the 500-ft strings were hydrostatically tested at 1000 psig. Upon completion of the line, the underwater sections were tested hydrostatically at 750 psig. Actual maximum working pressure will be 350 psig.

The covered pipe which weighed about 475 lb per ft in the air was pontooned during the pulling operation to a weight of 21 lb per ft. It has an ultimate weight in the water after release of the pontoons of about 150 lb per ft.

Through hundreds of years of use, the bottom of New York Harbor has become a veritable junk yard. During the dredging operation two large anchors and innumerable other pieces of cable and ships parts were brought to the surface.

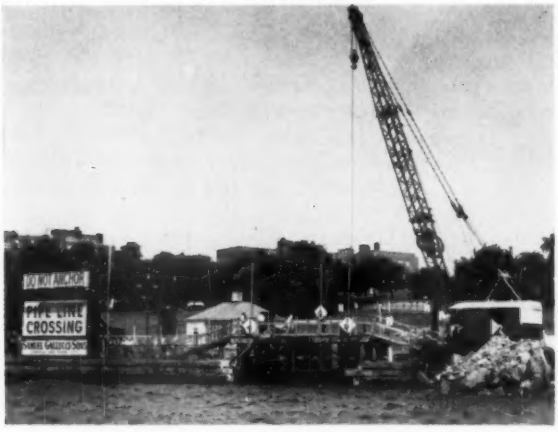
To insure against snagging of the pulling cables or the pipelines in such debris, and also to insure full width of trench and a relatively smooth bottom, a large sled of the same width as the trench was constructed. After the initial cable was laid by a telephone cable boat, the sled was pulled the full length of the trench. Three lead lines were then pulled back by the sled for subsequent use in pipe pulling. In all, 14 pulls were required of cable, pipe, two part line and block, sled, etc. in order to finally install the

four pipelines in their proper locations.

A number of heavy winches were used. A Collins Seamaster provided the pulling strength for the pipe, a Rivermaster winch was used as a holdback on the pipe, and an LST winch owned by Consolidated Edison primarily handled the cable pulls to Staten Island. All of the winches were mounted on rollers, with a dynamometer used between the winch and anchor piles to measure the pull being applied.

The pulling attachment on the nose of the pipe was a pulley block made buoyant by an attached pontoon. This block was pinned to a pulling head which was welded to the pipe. An 1¼-in. steel cable passed through the block and back to the winch. The winch reeled in both ends simultaneously.

During the pipe pulls, frequent fathometer checks were made as to the pipe location in the trench. Upon completion of the pull an inspection was also made by a diver. When necessary, a derrick boat was available for lifting and shifting the pipe. After the proper location was assured the pontoons were released.



Brooklyn receiving pit in sea wall.

The backfilling of such a trench was no simple operation. Clean sand brought in by barge was dumped to fill the trench to a depth of 16 ft over the pipe. Constantly changing tides and currents made proper placement at depths up to 95 ft a difficult problem.

As is true of all pipeline work, the activity and seeming confusion are gone. The cranes, launchers, pontoons and launching control tower have been removed. The "Do Not Anchor" signs are down. The surface of the waterway is undisturbed and the shores show only minor marks of a project costing many millions of dollars. The crossing has been successfully made and the benefits will be apparent in the New York area for many a winter to come.

General contractor for the project was Samuel Gallucci and Sons Inc. Pipe launching equipment was furnished by Collins Construction Co. Considerable engineering assistance was obtained from the Consolidated Edison staff. ■

Hydraulic jack drops pipe from racks to launchers.

Below: Launching operation gets under way.

GAS MEASUREMENT

some thoughts to ponder

By J. FRED EBDON AND FRIENDS

ONE of the major eccentricities in modern commerce is the appalling poverty of recognized standards for gas measurement. The gas business—while regulated from the umbilical cord to the ultimate end by statutory law, commission edict and court decision—is still in an infancy of technical standards development for commercial gas measurement.

Someone among the many who are smarter than I, once stated that the level of our civilization rests more upon our standards of measure than upon statutory enactment. If this intelligence is accepted, then gas measurement is indeed experiencing a barbarous era.

While it is true that those interested in fair and impartial accuracy for exchanges of gas need not hesitate to adopt American Gas Association Gas Measurement Committee recommendations in their entirety, what is at hand is only recommendations. Thus, said exchanges of our basic product, especially those in interstate commerce, have become tediously complicated by non-uniform gas measurement practices among different operators and locals.

Before I set a solution-laden barkentine asail on troubled waters to meet the swashbuckler-swung swords of complacency, it will be well to light a lamp of exploration among current techniques to determine if they are adequate or failing. Consider then, the units of gas measurement currently in vogue.

Directing attention to the volumetric unit, the ever-present cubic foot, one is tempted to wave it aside with a flip of the mental hand. Why every grade-school boy knows what a cubic foot is. Apparently, then, it is the grade school teachers who join much-maligned editors in searching for a clear, specific set of physical conditions that will permit one to rigorously define the actual phantasmagoric parameters of a cubic foot. One wag has borrowed a phrase to say that with a cubic foot, "it's what's inside that counts."

The cubic foot may be a cubic foot to very exacting dimensional tolerances, to be sure, but it is only of passing interest to the gas industry until it is packed with gas. Then, we lose our basic interest into linear concepts and modulate to an interest to discern the temperature and pressure controlling the packing. When these physical conditions are referred to some given set of values, a so-called cubic foot results.

Calorific value is another common and current unit used for commercial gas measurement. Normal deployment of this system brings the therm into popular usage. But therm measurement is generated through a chain that binds it to the incumbrances of volume determination. The chain is started with volume measurement, then Btu per unit volume is found, and therms turn out of calculation with the two.

It has been said that the calorific system is true equitable measurement since the gas industry, stripped to simplicity, is business founded on buying and selling energy. Hence, it is logical to measure the basic product on an energy basis.

This is a true story, but far from complete. Even

an "average" sales contract negotiated by your own company starts conflict within the calorific unit idea. A person inspecting one at random may note that in many cases—though certainly not all—the volume measurement needed is specified to occur at one pressure base in the gas measurement section of the contract, and then at a different pressure base in the gas quality section of the same instrument. For example, it is not unusual for the cubic foot unit to be defined as a cubic foot of gas under 14.735 psia, saturated with water vapor, for the purpose of quality or heating value determination. It is purely a matter of chance if this pressure base coincides with volume measurement conditions in the gas measurement paragraphs of the contract.

If we do not observe a coincidence, we have a pseudo-therm which does not approach being a standard of any sort. And a therm so measured will not contain the same relative measure of energy as a therm similarly measured elsewhere at a different metering pressure base.

Calorimetry is in itself an exacting science. We have no quarrel with it. But there is an area for understanding its relationship with buying and selling gas on a thermal basis. To my knowledge, no practical commercial calorimeter is designed with an integral water vapor compensating mechanism. Yet, all commercial quality natural gas has a water vapor component. One of the physical properties of water vapor is that it will not burn. Another is that it contains no heat or energy except through position or transition. In any case, when natural gas is combusted, the ever-present water vapor adds nothing to the heat content of a unit volume; in fact, latent heat of vaporization subtracts from the total potential heat of combustion. Thus, the more water vapor a cubic foot of natural gas contains, the less the sensible heat content will be.

Applying these factors to calorimetry leads us in search of mechanics of purpose. We have a choice. Shall we determine the Btu of a cubic foot of gas while it is "wet" or "dry." Since gas is not as readily wrung out as the proverbial, and practical dishrag; the easy, inexpensive path is usually taken and gas is saturated (rather than completely dried) prior to introduction to a calorimeter. The heat contained in a saturated cubic foot is then very well determined by the calorimeter. Thus, we know heat content per cubic foot at the contract quality pressure base on a saturated basis. This would lead to great comfort if gas volumes passing through sales meter stations were also saturated; provided, of course, the gas was metered at a flowing pressure approximating the contract quality pressure base.

But we all know that things just don't work that way. We don't try to keep system gas saturated. We spend a lot of money and effort to keep it on the dry side. The pipelines want dry gas; consumers want dry gas (although they probably haven't the remotest idea of the meaning); and the distributing utilities have been known to assert their desires for dry gas.

There are limits to the amount of water vapor pipeline gas will "carry." As gas molecules are drawn closer together under compression associated with pipeline system operation, they tend to squeeze out water. The higher the pressure, the amount of water required for saturation diminishes. In fact then, the flowing gas in pipelines is usually pretty dry—between 1 and 7 pounds of water per MMcf of gas might be about average.

More often than not, the sales volume is metered at high pressure. This is usually many times the pressure value of the "quality" pressure base. And there are good reasons for metering at higher pressures. All of them are economic. It is simply true that smaller measurement facilities and smaller transmission lines may be used when gas is under high pressure. Also, compression costs per cubic foot are lower.

I have rambled around a bit to prove what you already know. Metered sales volumes of gas contain very little water. From the meters, it is the common practice to reduce the pressure of gas to calorimeters to almost atmospheric. After that, the gas is saturated. But the big fly in the muddled soup of standardization in terms of therms is that at this reduced pressure the gas can absorb a lot of water—maybe 800 pounds per MMcf.

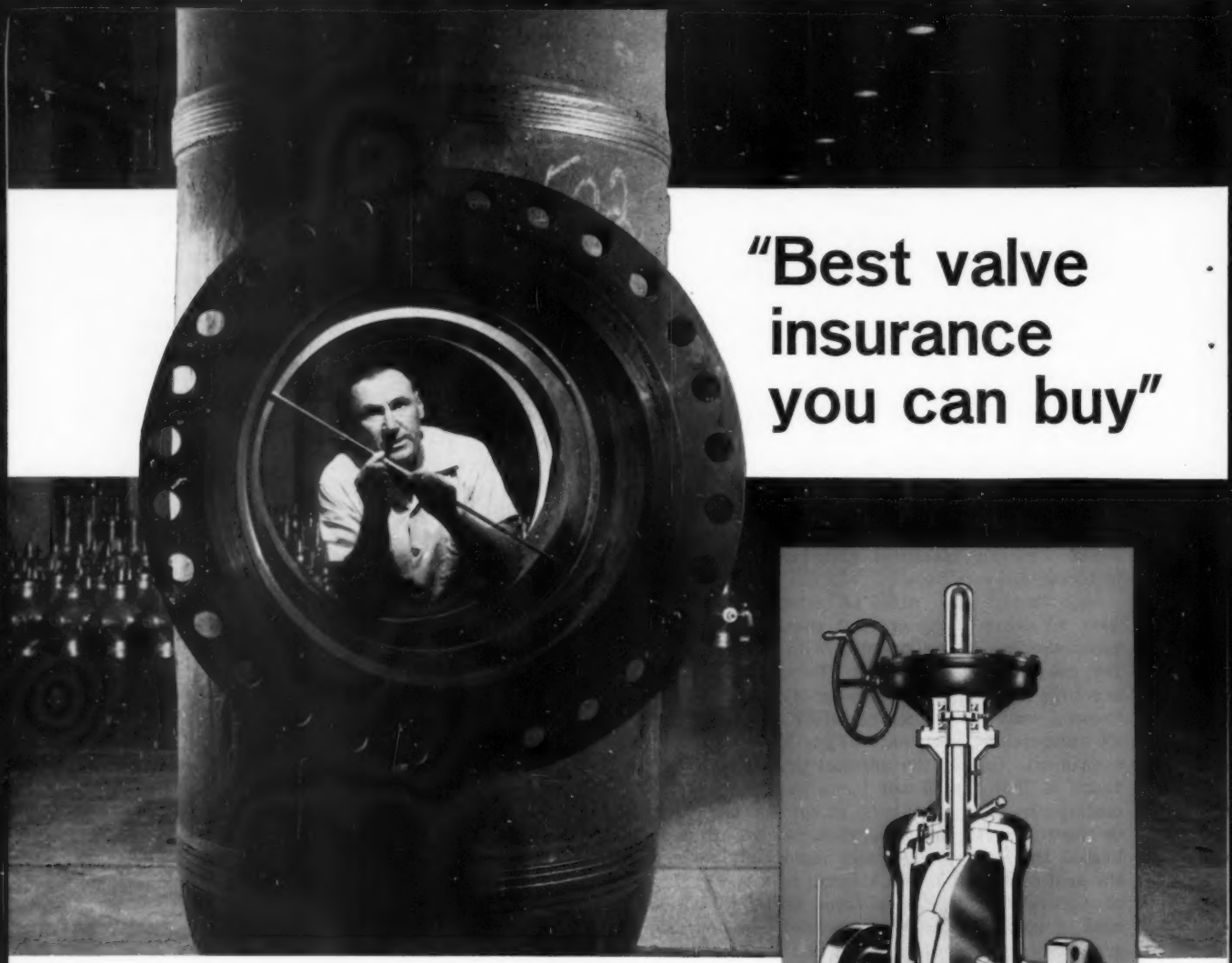
That is a lot of water and certainly an oceanful from the pretty dry gas that was metered for volume's sake. I think it almost unnecessary to add that our previous words expound the fact that each cubic foot delivered to a customer contains more heat than our calorimetry tends to indicate.

However, that is not our objective. It is not the basic point to be made and considered. If the difference were a constant that prevailed everywhere, there would be a standard unit of gas measure. But it does not.

Prior to this writing we have given pause to the idea that the cubic foot as a standard unit of gas in commercial sales is lacking. Some say that it doesn't look as inept as therms, others find it much less valid. In any case, it has all of the faults of volume measurement used to determine heat content. And it has no consideration for those inert gas molecules entrained in the hydrocarbon mixture or the change in calorific value from that of the hydrocarbon components alone. Bear in mind that we would have these (and other) faults with the cubic foot even if the pressure condition for measurement was uniformly defined and followed.

I have said it before, but feel the overwhelming desire to say it again, that the lack of a nationally recognized standard cubic foot has saddled the gas industry with a pressure base for each of Solomon's wives. No doubt, the number of Solomon's wives added to his prestige and wisdom in those days. Having enjoyed the prestige of only one wife, I am probably in a very precarious position to comment, but I am forced to say that I doubt Solomon's wisdom. I am very sure that the many pressure bases do not add prestige or wisdom to the gas industry. Rather the contrary is true. There is still an awful lot of difference between an hour and a cubic foot of gas.

There is a muddle in the field of gas measurement today. Lots of people want to maintain the status quo. But, there are others who seriously strive for



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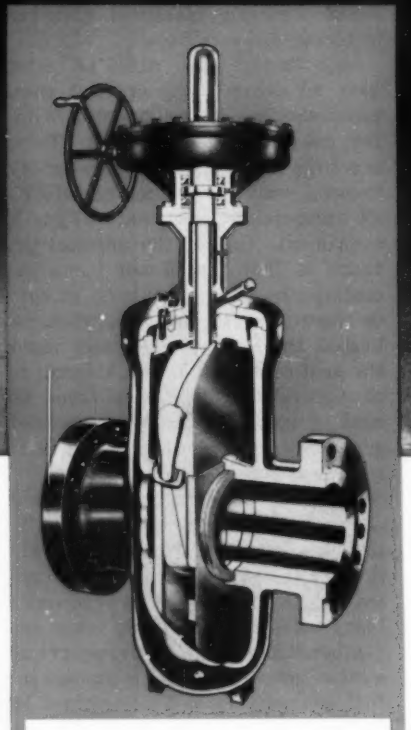

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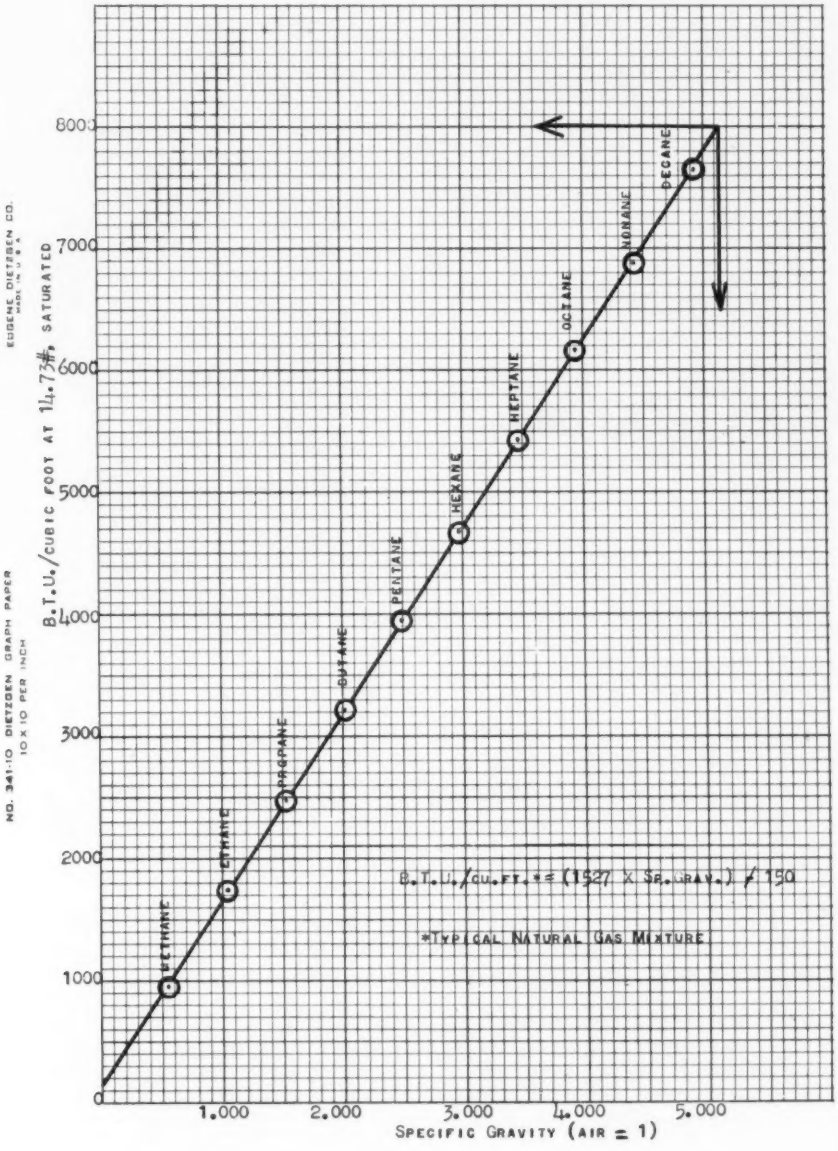
improvement of the situation. The measurement superintendents of Southern Gas Association have gone on record as being opposed to the lack of an equitable, uniform unit for measuring gas. And the AGA Gas Measurement Committee has discussed the problem. Basically, measurement men—on the most part—are eager to progress. They just need the help of management and backing of the industry.

The discussions mentioned before have all hinged around pressure base. Settling that issue would help, but it would not provide the most advantageous unit of measure. The Btu will continue to be of importance long after the pressure base matter is resolved.

We need to buy and sell energy, or heat. This brings us back to the problem of measuring stored energy again. A few years ago we might have been inclined to give up and say that we couldn't lick that problem. But now things have changed. There are better instruments and better means of doing a job. The answer to the problem has been available all the time. We merely needed a mass meter.

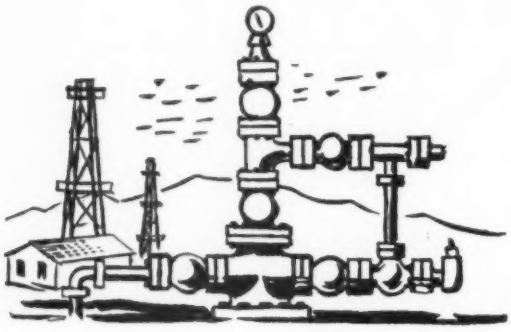
There is a linear relationship between mass and energy in the case of hydrocarbon gases. If we can forget for a moment that gases most often contain inert properties, we can see what a mass meter can do for us. A pound of hydrocarbon gas, whetever the composition, contains a relatively constant amount of heat or energy. There is a minute difference between the energy content of a pound of one hydrocarbon component and another, but it is so small that it takes a microscope to find it. Anyway, commercial gas is almost pure methane. So this makes the difference even smaller.

Take a piece of graph paper and plot specific gravity versus Btu per cubic foot of all the pure hydrocarbon components found in natural gas. Then, take



a straight edge and lay it through the plotted points. It follows that any mixture of these components will fall on this line. Therefore, pounds of hydrocarbon gas is but another measure of energy. If you know the weight of a given amount of hydrocarbon gas, you know the energy that it contains, or the therms.

Measure the weight of the gas and adjust the unit price accordingly. Let's say you have been buying or selling 1000 Btu gas at 50 cents per Mcf or 5 cents per therm. The 1000 Btu gas should be around 0.22 therms per pound or 45 lb per Mcf. Then a comparable unit price per pound would be 1.11 cents. Fifty cents per thousand cubic feet looks expensive in some circles. A cent per pound of gas, on the other hand, seems unreasonably cheap. A pound of gas is a lot of gas, or heat, or energy. All for a penny. Gas people have always known that they delivered a lot for the money received. That view is not always shared by the public or governmental bodies. A pound of gas as a unit of measure would aid the industry in getting their message across.



Now, for sake of the technician, let's look at instrumentation. Presently, gas measurement instrumentation is complex. A simple flow meter is just part of the story. To the flow meter add recording thermometers, calorimeters, gravitometers and supercompressibility apparatus. Aside from instrumentation, we must necessarily delve within the realm of the gas accountant. Here records and recordings become a multitude of factors. Then after a while we arrive at a therm or an Mcf of which there are several varieties at as many pressure bases.

You may say that all of the foregoing sounds good, but how do we measure pounds of gas. There is a need for two bits of information: stream velocity and gas density. There are lots of ways to measure velocity. Density isn't quite so simple, but there are several gadgets on the market that lay claim to being equal to the need. Upon measuring density, pressure, temperature and supercompressibility are automatically taken into account. So, instrumentation becomes simpler along the mass metering route. Calculations, also. And the customer gets a break. This type of measurement is fair to both buyer and seller. The unit of measure becomes something that everybody understands. A pound is a pound, whether it be gas or coal or potatoes. That is something a customer serviceman can explain to the country hick or the city slicker. The pound is a unit of measure of which the customer is not suspicious. But just you pull this pressure base malarky on the same customer. His recourse will be to write his congressman with a plea that the congressman vote to lower the depletion allowance.

There are several mass meters presently on the market. Yet it is not necessary to junk all our pretty orifice measuring stations for sake of changing over from volume measurement to mass measurement. Add a density sensing device in replacement of several other instruments and you are in business.

Measuring gas by weight is sure to come. It is but a matter of time. The big problem is to change all the fancy measurement clauses in gas contracts, change the wordage of state gas measurement laws and get the governmental bodies to accept the pound as a unit of measure. This presents a challenge to the various trade associations.

To humor fellows that like the cubic foot as a unit of measure, the cubic foot may be so defined to be equal to a pound. How? Simply define the specific gravity of a cubic foot of gas and change the pressure base to cause the cubic foot container to hold a pound of gas. The wordage could easily read as follows:

> "The unit of measure for the purposes of buying and selling gas shall be a pound of hydrocarbon gas; or the volume of 0.6 specific gravity hydrocarbon gas contained within a thousand cubic feet of space when under a pressure of 0.3207 lb per square inch absolute and held at a temperature of 520 deg Rankine."

Sure! A pressure base of 0.3207 lb per square inch is an odd-ball. But it contains no more digits than does a pressure base of 14.73. The calculations would be no more difficult. And a conformist could continue measuring his Mcf. Somewhere along the line he would discover that his Mcf is the same thing as a pound of gas and it is easier to measure a pound. So, his resistance would break down. Or the pound could be measured and called an Mcf. Same thing.

The reader will note that the term "hydrocarbon gas" was used. This inclusion is the thing that makes the pound unit work out equitably. If a gas mixture contained 2 per cent of inert gas or water vapor, then the total weight could only be 98 per cent hydrocarbon gas. Multiply the total weight by 0.98 and there would result a figure that the billing department could use.

The advances made within the field of gas analysis within the last few years make the determination of inert components within a gas mixture an easy chore. Periodic sampling and testing of a gas stream should suffice to supply the necessary adjustment factor.

Those pondering these thoughts should sound off to the "Old Meterman," c/o Gas Magazine. There are a lot of people thinking these days. What do you think about the subject? ■

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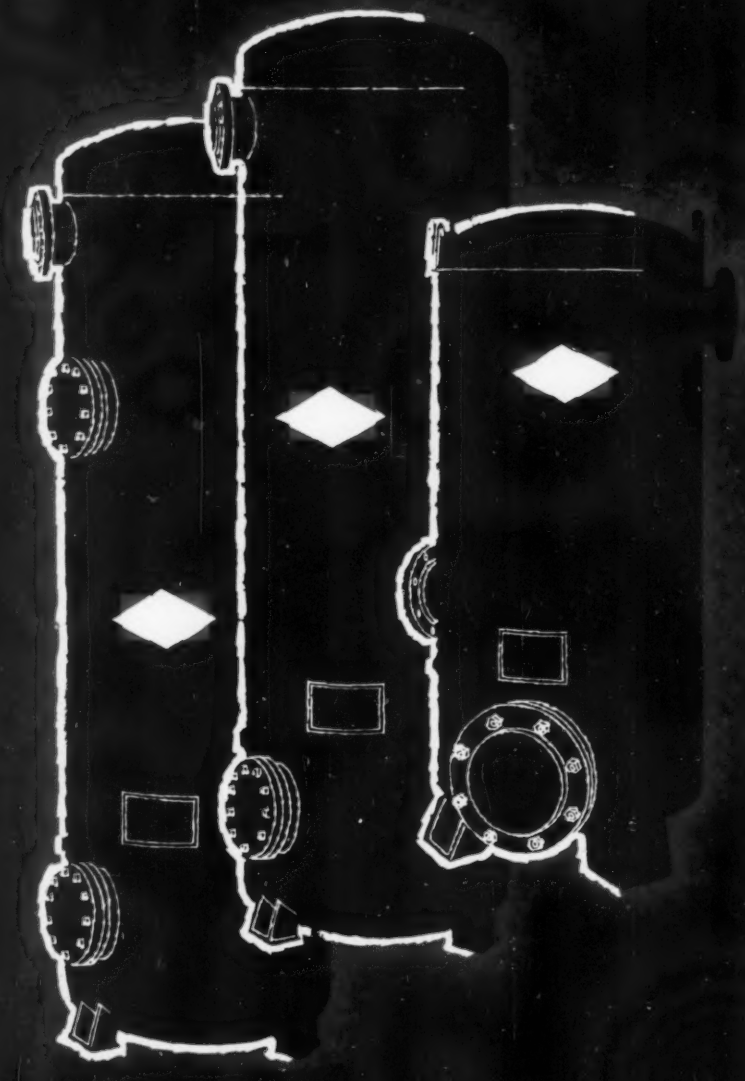

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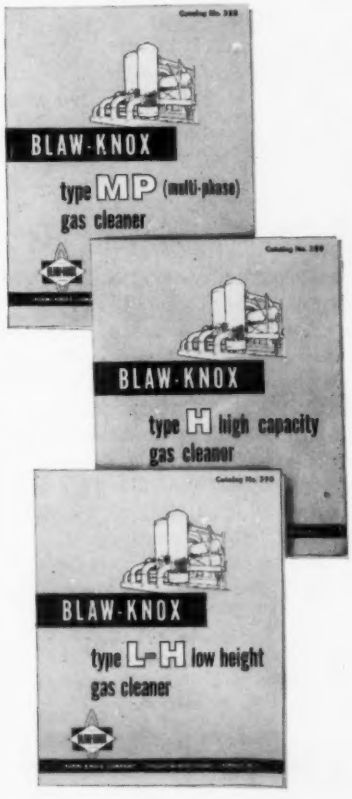

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Buflovak Equipment Division
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Edited by FRANK CHAPMAN

Semi-flexible transmission lines for 6000 mc and above

By F. VINTON LONG

THE nice part about our 2000 Mc and below radio equipment has always been the ability to feed our antennae with a coaxial line.

The curse of 6000 Mc or above was that we were stuck with rigid wave guide.

That made it impractical to pipe a signal from equipment on the ground to antennae on the tower because of high wave costs.

That necessitated the use of tower-mounted reflectors.

That was not cheap.

You can do it now with coaxial line on short towers. Probably, the practical limit would be a 50-ft run before losses become too great.

However, perhaps the greater advantage of semi-flexible cable is its flexibility. It means that you place your radio equipment where it is most convenient and the antenna where it will do the most good. You can place the radio gear in the bottom of a building, for instance, and the antenna on the roof.

It also means that at a repeater station you can place your equipment at any angle you wish with respect to the tower, as you do not have to worry about reflection angles from a tower-mounted passive reflector.

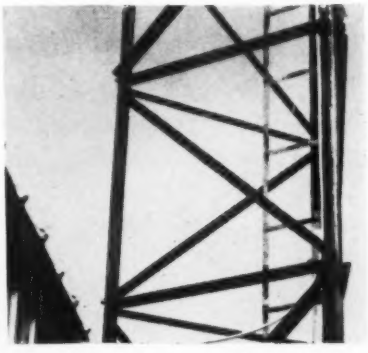
This cable has been used by one of the larger pipelines—to replace wave guide on 6000 Mc and it works fine.

One advantage over wave guide is that complicated flanges are eliminated and also the skilled labor required to install them. This would reduce the installation cost even in conventional locations where the antenna is quite close to the RF equipment.

Coaxial line wave guides in drone aircraft for the AAF, working in the 8000 Mc range, and installations at 12,000 Mc are now being tested by the military.

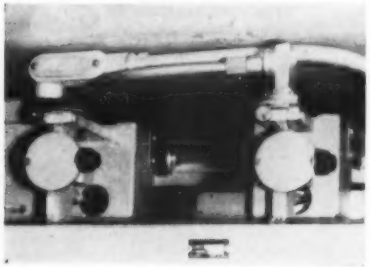
I understand that consultants have discovered excellent broadband capabilities of this cable wherein no discontinuities occur, right up to the cutoff frequency of the line and with no periodicity effect. ■

Antenna with coaxial line adapter. Line runs down right-hand tower leg.

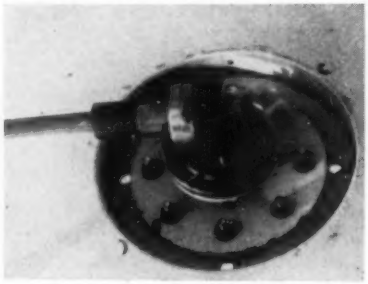


Bottom view of tower, with semi-flexible coaxial line running into equipment room to left.

Coaxial adapter mounted on RF equipment (right side of photo), with cable running out (to left) to antenna.



Coaxial adapter, connecting to antenna mounted on reflector.



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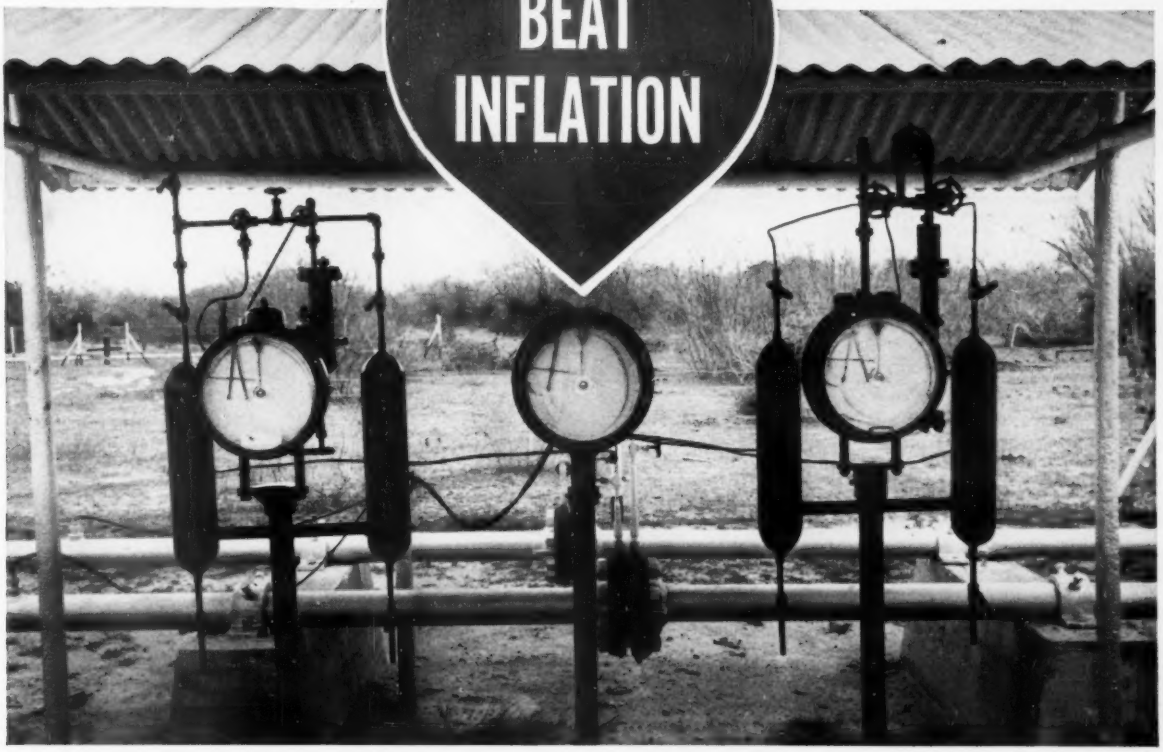

Foxboro high-precision gas metering team in action at Western Natural Gas Company installation in Edinburg, Texas. Foxboro Anti-Ambient Temperature Recorder (center), and Foxboro Gas Flow Meters. For over 14 years, Foxboro instruments have been providing "cash register" accuracy for this field.

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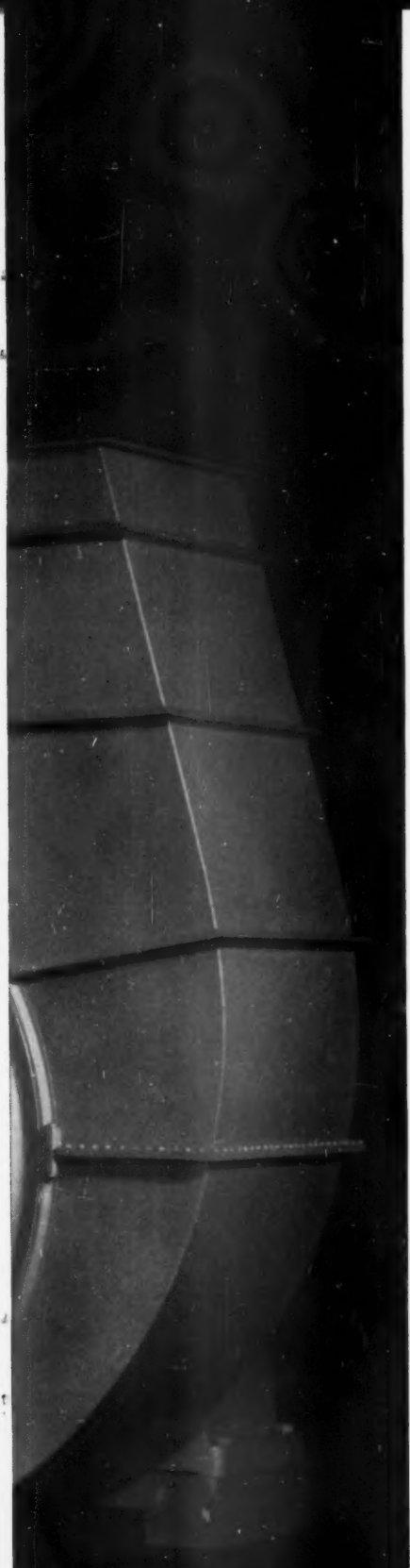

Quarter scale model of experimental gas turbine being developed by Cooper-Bessemer and Pratt & Whitney Aircraft. Units should be available for use within 18 months.

How Cooper-Bessemer is teaming up with Pratt & Whitney Aircraft to develop JET TURBINE POWER for industry

The cutaway model shown is a revolutionary new concept in gas turbines. The generating unit is a new Pratt & Whitney Aircraft jet engine—a modification of the famous J-57 aircraft engine, designed for gas fuel. The companion power unit is a new Cooper-Bessemer power turbine. This combination, now in the advanced experimental stages, represents the hottest development in industrial power in 20 years. It will mean drastic economies in installations of engine-driven compressors, generators and other rotating machinery.

For example, in gas compressor stations, it is expected to reduce total station cost by 50%!

Plans call for this new gas turbine to be available for broad application within 18 months. In the meantime, watch for reports on further developments in this pioneering teamwork by Cooper-Bessemer and Pratt & Whitney Aircraft.

BRANCH OFFICES: Grove City • New York • Washington • Gloucester
Pittsburgh • Chicago • Minneapolis • St. Louis • Kansas City • Tulsa
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SUBSIDIARIES: Cooper-Bessemer of Canada, Ltd.... Edmonton • Calgary
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C-B Southern, Inc.... Houston
Cooper-Bessemer International Corporation... New York • Caracas • Mexico City
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GENERAL OFFICES: MOUNT VERNON, OHIO

ENGINES: GAS • DIESEL • GAS-DIESEL
COMPRESSORS: RECIPROCATING AND CENTRIFUGAL,
ENGINE, TURBINE OR MOTOR DRIVEN

Michigan Wisconsin Pipe Line Company...

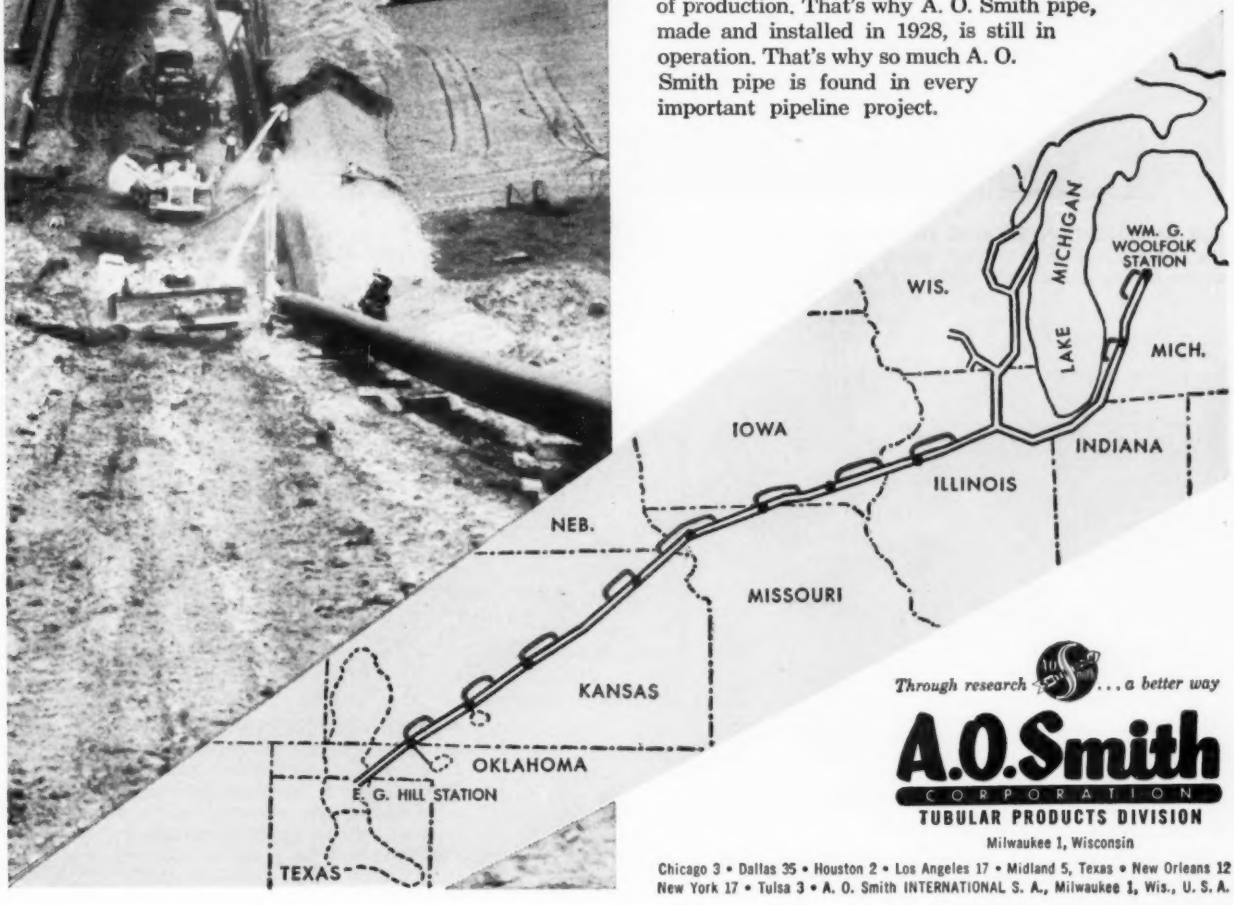
loops for

larger volume

374 miles of looping spans midwest...swells main line capacity for average day by eighty million cubic feet of natural gas

During July, Wisconsin and Michigan gained an added eighty million cubic feet of natural gas daily — through new loops paralleling Michigan Wisconsin Pipe Line Company's main line. Between the Laverne field in Harper County, Oklahoma, and the W. G. Woolfolk Station near Big Rapids, Michigan, 374 miles of 24-inch pipe were laid — all furnished by *A. O. Smith.*

For almost 30 years . . . A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe, made and installed in 1928, is still in operation. That's why so much A. O. Smith pipe is found in every important pipeline project.

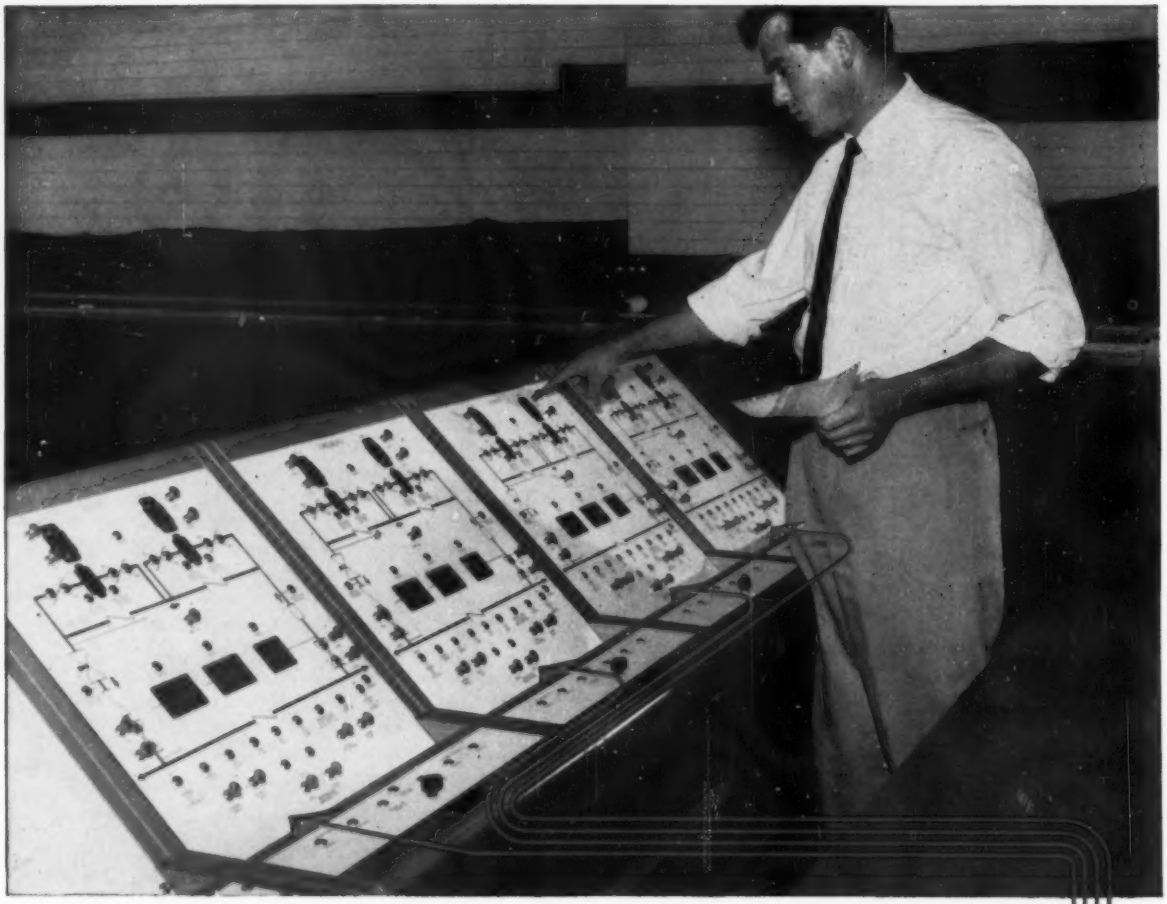


Through research ...*a better way*

A.O.Smith
CORPORATION
TUBULAR PRODUCTS DIVISION
Milwaukee 1, Wisconsin

Chicago 3 • Dallas 35 • Houston 2 • Los Angeles 17 • Midland 5, Texas • New Orleans 12
New York 17 • Tulsa 3 • A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wis., U. S. A.

Union Centralized Transport Control pays



LOS ANGELES CONTROLLING OFFICE—The heart of the whole operation is in Los Angeles where one man at the control console can supervise the operation of four unattended pump stations 643 to 804 miles away. The operator has complete information before him showing conditions all along the line.

PHOENIX
Output Terminal

TUCSON
Output Terminal

APACHE
Unattended Booster Pump Station

REMOTE CONTROL—Either pumping unit at any one of the four booster stations can be started or stopped from Los Angeles. The sequence in opening and closing valves and starting and stopping pumps is all handled automatically and correctly by the control system.

off for Southern Pacific Pipe Lines

Push a button in Los Angeles and four pump stations throb into action out on the desert over 600 miles away

Union Switch & Signal equipment controls operating sequence and telemeters operation of 33,000 bbl/day products line

FLEXIBILITY and fail-safe operation are the keynotes of the new pipeline system operated by Southern Pacific Pipe Lines, Inc. The line is used to transport refined products such as gasoline, jet fuel, diesel oil, etc., from El Paso, Texas, to Tucson and Phoenix, Arizona. All Centralized Transport Control equipment for four unattended booster stations was supplied by Union Switch & Signal.

REMOTE or LOCAL: All four booster stations are normally controlled from Los Angeles. Any station can be controlled locally, when desired. In any case, continuous pressure and suction readings are displayed on the console at Los Angeles and automatically recorded every fifteen minutes by an automatic typewriter. Any malfunction, at any point in the system, is indicated on the console. The equipment affected is shut down automatically and cannot be started again until the trouble has been cleared.

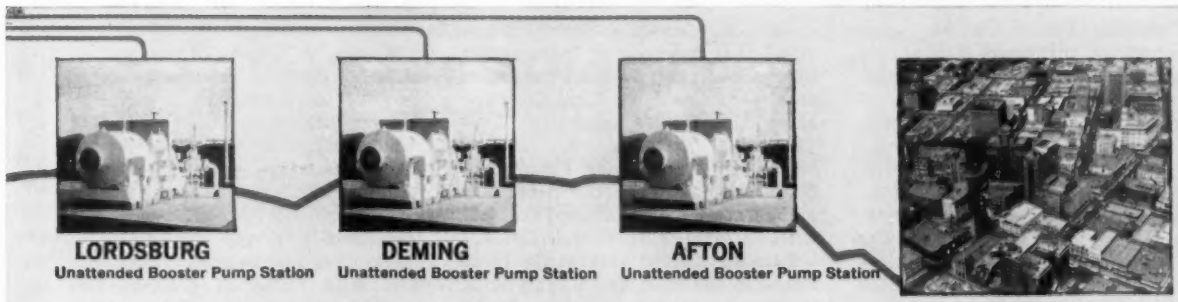
COMMUNICATION: Four telegraphic-type communications lines, owned by Southern Pacific, are used to transmit control codes to the stations and telemetered information back to Los Angeles. Each line serves one station. An additional commercial communications line serves as a stand-by for all four stations. Signals are coded to prevent noise or interference from causing faulty operation or indication.

MAXIMUM EFFICIENCY: The Centralized Control system, designed and installed by Union Switch & Signal Division of Westinghouse Air Brake Company, cuts down the chance for expensive error. It keeps the Southern Pacific Scheduling Department in Los Angeles informed, at all times, of exactly what is happening in the field. It speeds operation, adds security and reliability.

Union Switch & Signal has designed many successful custom systems for pipeline companies. And now out of that experience, it has developed standardized central control systems that cut costs, add flexibility, and save space, as well as making pipeline control extremely reliable.

"Pioneers in Push-Button Science"

UNION SWITCH & SIGNAL
DIVISION OF WESTINGHOUSE AIR BRAKE COMPANY
PITTSBURGH 18, PENNSYLVANIA



LOCAL CONTROL—Operation also can be controlled automatically at the pump station. Or the station can be run manually. The choice is up to the local station. But Los Angeles always knows which mode of control is being used and always receives a continuous flow of system information.

THE FUTURE—Southern Pacific Pipe Lines, Inc. can already see opportunity to make this system more automatic and more efficient. They plan, in time, to be able to let stations **adjust automatically** to proper unit operation when an upstream or downstream station goes off the line.

GAS • PIPELINE NEWS

Lone Star shares gas with Oklahoma Natural

FPC has accepted a presiding examiner's decision allowing Lone Star Gas Co. to build new pipeline facilities. The certificate lets Lone Star connect its transmission system with recently contracted major gas reserves in the Knox field of Grady county, Okla. (Dockets G-17897 et al).

Ten producers also were authorized to sell the gas to Lone Star.

Under the plan, meter and dehydration facilities will be built by Oklahoma Natural Gas Co., Tulsa. Oklahoma Natural will get half of the gas produced in the Knox field, Lone Star the other half. Later, Lone Star will assume half ownership of the new facilities.

Oklahoma Natural will use its half share of the gas produced in intrastate commerce. The entire supply was to go to Oklahoma for intrastate use if Lone Star failed to get an FPC certificate by Nov. 1.

Initial gas price is 16.8 cents per Mcf, including Btu and tax reimbursement adjustment.

The commission pointed out that no new plateau for producer prices would be set by okaying Lone Star's purchases. Purchases by Oklahoma would "establish the plateau regardless of our action."

Trunkline must deliver gas to United Cities

Trunkline Gas Co. must supply part of an increased gas supply sought by United Cities Gas Co., Chicago. United Cities wants to increase deliveries to Metropolis, Ill.

The decision, however, denies requests by three Kentucky cities seeking gas supplies from Trunkline (Dockets G-17208 et al). The presiding examiner said Trunkline does not have enough unallocated capacity to meet the needs of these three cities or to supply the full amount sought by United Cities.

United Cities wanted an added 800 Mcf from Trunkline. The examiner concluded that Trunkline could furnish only 225 Mcf of this amount. United Cities already has an existing connection with Trunkline's system.

Trans-Canada increasing Alberta Reserves

Trans-Canada Pipe Lines Ltd. now has about 7.5 trillion cu ft of natural gas under contract for its Canadian and proposed American markets.

This substantial increase in reserves "is the result of an aggressive gas purchase program carried out during the last few months," according to president James W. Kerr.

"Trans-Canada has a fully adequate volume of gas to take care of all its contracted Canadian sales and the Emerson export program. Actually, Trans-Canada has purchased 12 per cent more . . . gas than is required to fulfill existing contracts . . . This additional 12 per cent is available for future Canadian requirements which are not yet covered by contract," Kerr explained.

If the Alberta Oil and Gas Conservation Board approves Trans-Canada's plan to take an added 700 billion cu ft of gas from the province, it will increase its total take to 6.57 trillion cu ft. When the company's first permit was issued in 1954, the take was 4.35 trillion. Trans-Canada also has a contract to purchase 140 billion cu ft from Saskatchewan Power Corp.

Producers told to resume sales to United Gas

An FPC presiding examiner has ruled that a group of independent producers must resume gas sales to United Gas Pipe Line Co. The sales were abandoned in 1957 (Docket G-10922).

Presiding Examiner Francis L. Hall concludes that the producers should not have abandoned the sale without prior FPC authorization.

Sale to United was made from leases in the Huff and Fagan fields in Refugio county, Texas by P. R. Rutherford; Patricia Rutherford Richter; Patrick Rutherford Jr.; the National Bank of Commerce of Houston and Harold Decker, Trustees of the Michael Giles Rutherford Trust No. 2; and K. D. Owen.

The Rutherford group filed an application with the FPC in August 1956 seeking authorization for the abandonment. The sale actually was stopped in 1957 before the FPC took action. The gas is now being sold in intrastate commerce at a higher price to the Industrial Gas Supply Corp. United's pipeline facilities still connect the producers' wells to the company's main system.

The Natural Gas Act provides for exclusive FPC control over abandonments, Hall pointed out. It also prohibits any natural gas company from stopping deliveries without express commission authorization. The producers claimed that United does not need the gas while it is vitally needed by Industrial to continue service to existing customers.

The examiner said that although United did not appear at the hearing, there was nothing in the record to show the company did not need the gas. He said that for the producers to urge that the abandonment would not have an important impact upon United "is to argue that impropriety is all right so long as it is not great."

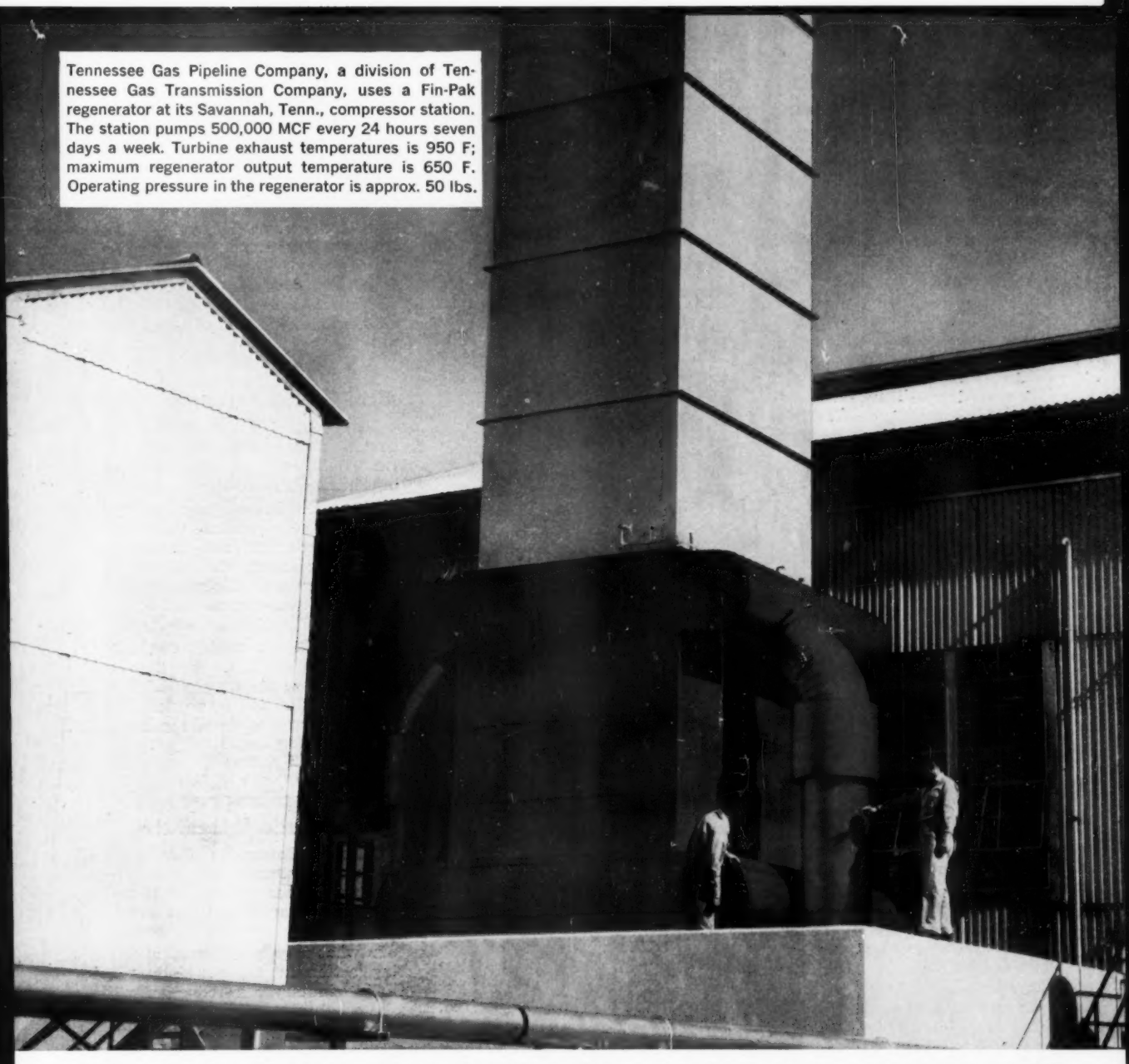
Texas Illinois to become wholly owned subsidiary

Under a new plan, Texas Illinois Natural Gas Pipeline Co. will become a wholly owned subsidiary of Peoples Gas Light & Coke Co., Chicago.

Peoples Gas now owns 70.56 per cent of the outstanding common stock of Texas Illinois. The plan calls for common stockholders of Texas Illinois to receive one share of Peoples Gas capital stock for each two shares of Texas Illinois common.

Assets of Texas Illinois will be transferred to a new wholly owned Peoples Gas subsidiary in exchange for capital stock of Peoples Gas. Also under study is the redemption of outstanding shares of Texas Illinois cumulative preferred stock ($5 series). Also contemplated is the ultimate merger of the present assets and business of Texas Illinois with those of Natural Gas Pipeline Co. of America, another wholly owned subsidiary of Peoples Gas.

Completion of the plan is contingent upon receipt of a ruling from the Internal Revenue Service that the exchange will be tax free to the common stockholders of Texas Illinois and to the companies in the Peoples Gas system.



Tennessee Gas Pipeline Company, a division of Tennessee Gas Transmission Company, uses a Fin-Pak regenerator at its Savannah, Tenn., compressor station. The station pumps 500,000 MCF every 24 hours seven days a week. Turbine exhaust temperatures is 950 F; maximum regenerator output temperature is 650 F. Operating pressure in the regenerator is approx. 50 lbs.

FIN-PAK HEAT EXCHANGER CUTS FUEL COSTS 32%

An Air Preheater Fin-Pak can pay for itself in approximately 6 months *on fuel savings alone.* For example, a Fin-Pak with a designed effectiveness of 75%, in a gas turbine cycle at 6 to 1 pressure, and a turbine inlet temperature of 1500°F, can cut fuel costs by 32%. And the improved combustion you get with a Fin-Pak reduces residual carbon deposits, cuts maintenance of other equipment in the system.

Fin-Pak provides big installation savings, too. It's compact (takes less than half the space of tubular regenerators of identical capacity) and weighs 50% less than an equally efficient tubular unit — so it's easier to erect and needs less expensive support structure.

No maintenance is required, other than infrequent cleaning with compressed air. The Fin-Pak has short, straight-through passages that facilitate cleaning.

ONE LAST THOUGHT: A gas turbine station requires approximately 80% *less* plant maintenance personnel than a station of equal capacity operating with diesels, steam turbines or gas engines. You can economize still further by incorporating a Fin-Pak in the gas turbine cycle. For complete details, call or write The Air Preheater Corporation.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N. Y.

Computers streamlining pipeline service

Two transmission companies are using electronic computers to design pipeline systems within minute and predict gas consumption one day before it reaches the customer.

The computers can tell in split-second time which compressors may be falling below expected output. Also, where new facilities are needed to increase pipeline system service. Weather data and gas consumption statistics available today also are fed into the electronic systems to predict how much gas customers will use tomorrow.

Texas Gas Transmission Corp. and Transcontinental Gas Pipe Line Corp. are using medium-sized Bendix G-15 digital computers.

Engineers, using statistics developed from several computing programs, computed a pipeline design for Transco's Louisiana-Pennsylvania system in 27 minutes. Normal time: three days.

Texas Gas is making a feasibility study for automation of pipeline operation. Also, Texas Gas uses daily data cards, temperatures and dates to predict firm natural gas demand required by customers in order to determine capacity available for interruptible service. Deliveries are correlated with historic data in order to produce the mean-cubic-feet of demand per degree day.

Transco engineers said whenever an expansion program is planned, they are now able to compute many more variations than would have been reasonably possible with previous manual methods.

"We are now able to optimize design and minimize required system facilities," Transco said. "A sudden change in plans no longer causes the jolt or ulcers it once did —we just run designs for the new plan."

Texas Gas buys Kentucky gas field

Western Kentucky Gas Co. is selling its interest in the West Greenville (Ky.) gas field to Texas Gas Transmission Corp.

Texas Gas president G. T. Tankersley said the agreement was made without profit to Western Kentucky, but gives the company storage facilities in a location closer to its major market. Also, a proposed Texas Gas pipeline from Slaughters to Bowling Green will be routed near Greenville.

Texas Gas expects to increase deliveries from the field. It also plans to make engineering studies and tests to determine the underground storage possibilities of the field.

Authorized construction tops record year 1951

Construction projects okayed by the FPC in the fiscal year ending June 30, 1959, topped the record-breaking year of 1951—$763,037,000 against $725,433,000.

During the year, FPC issued 198 certificates covering nearly 4900 miles of line and 614,000 hp in compressor units.

The $763 million added more than 10 per cent to the certificated investment in plant made by pipeline companies through June 1958. The new facilities will add nearly 3.25 billion cu ft of daily delivery capacity to the nation's individual transmission systems. This is nearly a billion cu ft more than those approved during the preceding fiscal period. These statistics do not cover certificates issued to independent producers.

Largest single plan during the year was Tennessee Gas Transmission's. It is building 1073 miles of 12- to 30-in. mainline loop, transmission, supply and storage laterals and 104,250 hp in compression. TGT is spending more than $169 million to increase its capacity by 406 MMcfd.

FPC calls "major" projects those costing $700,000 or more each. These accounted for nearly $730 million of the total. Fifty-eight major projects were authorized. They will increase daily delivery capacity of the individual transmission systems involved by more than 3.2 MMcfd. They include about 4600 miles of line and nearly 602,000 compressor hp. Major projects are expected to benefit 140 cities of 50,000 population or more in 25 states and the District of Columbia as well as many smaller communities.

FPC Chairman Kuykendall said that increasing numbers of "budget-type" applications are being filed. While costs are included in the statistics, information is not currently available on the facilities, capacities and benefits. Budget-type projects are designed to allow pipelines to buy new gas supplies near their systems as the gas becomes available during a specified future period of time. Thus, a company makes a "blanket" filing covering several projects, to be built as required, rather a series of separate small filings.

It has been 17½ years since the certificate provisions of the Natural Gas Act became effective. Since then, the FPC has okayed construction of nearly 85,000 miles of pipeline, more than 6 million hp in compressor units, and miscellaneous facilities at a total cost of about $7.2 billion.

Crose buys Perrault

M. J. Crose Manufacturing Co. bought Perrault Equipment Co. Inc. Both companies headquarter in Tulsa.

Clare G. Miller, president of Crose, said the purchase will effect important economies to individual contractors and to the pipeline industry in general. Both companies make pipelines construction equipment.

Crose will not market mechanical, hydraulic, and air line-up clamps. Also, the merging of Perrault facilities and personnel with those of Crose will make possible an expanded research program.

Rate reduction proposed by Colorado Interstate

Colorado Interstate Gas Co.'s wholesale customers are going to have their rates reduced by 11 per cent by new tariffs and rate schedules.

In what may be a precedent-setting action in the gas industry, CIG's voluntary rate reduction will slice off about $4.5 million annually from bills of natural gas consumers. FPC action is pending.

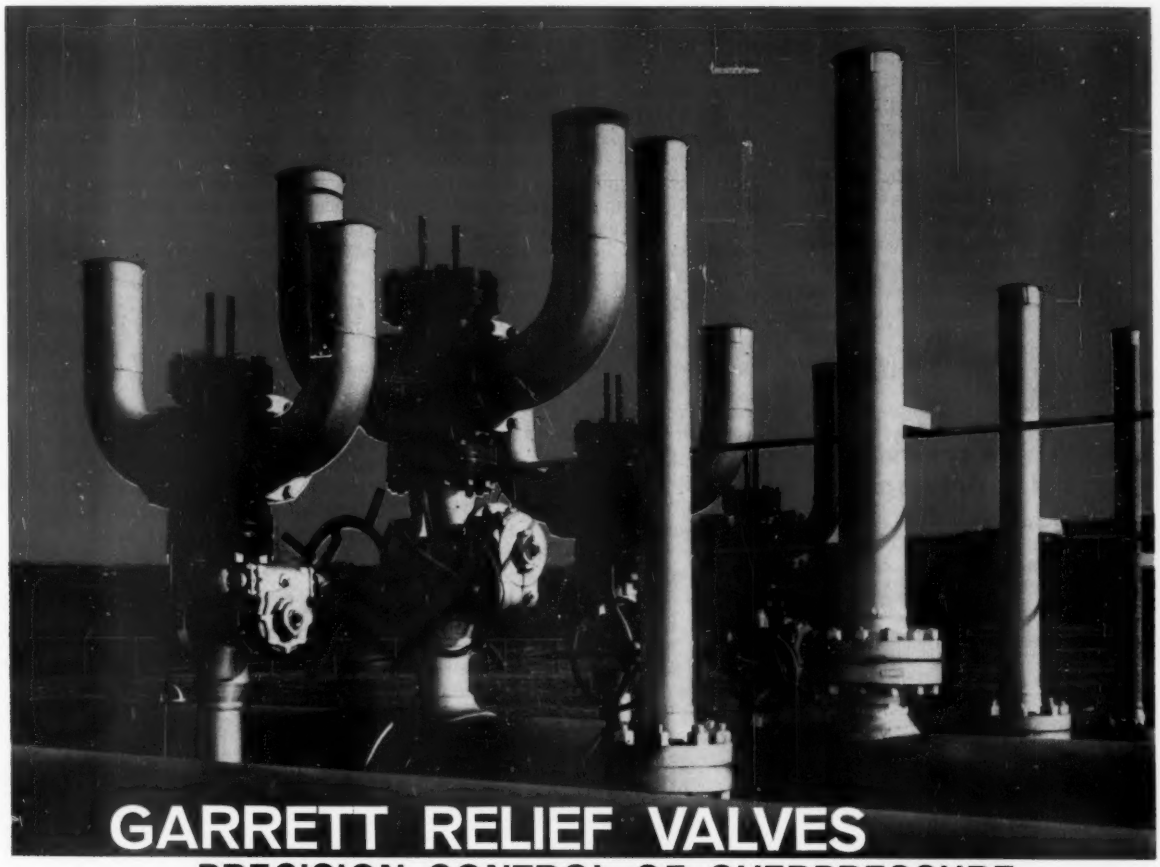
Largest reduction goes to Public Service Co. of Colorado, which serves the Denver metropolitan area. Its share: $2.3 million.

A PSCo. subsidiary, Colorado-Wyoming Gas Co., is second in line, with a reduction of about $950,000.

CIG President W. E. Mueller was hopeful that the FPC would okay the plan by Nov. 1.

As soon as the new rates become effective, CIG will seek FPC approval of a plan to make refunds reflecting the reduced rates back to Feb. 4, 1958. Through Oct. 31, this refund — including interest — is estimated to be about $6.7 million.

CIG's proposed tariff is a contract demand form.



GARRETT RELIEF VALVES

PRECISION CONTROL OF OVERPRESSURE

Less than 1 percent of pressure differential will actuate a Garrett Relief Valve. This exactness of control is maintained over hundreds of reset cycles.

When conditions change or the valve is used on other service it can be readily adapted to new set and blowdown pressures. The valve body is not removed from the line to test or reset pressures. Servicing is equally easy and can be done with ordinary hand tools and wrenches without removing the valve from line or vessel.

Automatic blowdown service or safety shutdown can be provided for all Garrett Relief Valves already installed or furnished for new installation.

Garrett field engineers are available to assist in planning your relief valve requirements, write or phone.

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Garrett Oil Tools

DIVISION OF U. S. INDUSTRIES, INC.

P. O. Box 2427, Longview, Texas

Columbia loop okay

FPC granted Columbia Gulf Transmission Co. temporary authority to build a 41.1-mile 24-in. loop in Louisiana (Docket G-18836).

The $3.9 million loop extends from Vermillion parish to St. Mary parish, La. The new line will not increase the company's mainline capacity. It will, however, enable Columbia to assure continued use of its mainline capacity to make required deliveries to its affiliate, United Fuel Gas Co., Charleston, W. Va.

New pipeline controls proposed in Arkansas

"Arbitrary" location of pipelines in Arkansas would be banned by a proposal submitted to the Arkansas legislative council. Also pipelines would pay a privilege tax for using public lands and navigable streams.

The proposal cited a recent ruling by a circuit court. The decision raised several questions regarding the "inadequacy" of laws covering pipelines, especially in regard to lines crossing state-owned waters and lands.

Legislation was suggested that would permit locating pipelines only after "proper study and hearing."

It was further proposed that a "reasonable privilege tax" be enacted for pipelines using public lands and waters. Funds from such a tax would go to agencies and institutions which depend on general revenue.

The earlier court decision directed Trunkline Gas Co., Tennessee Gas Transmission Co., and American Louisiana Pipe Line Co. to pay the state $1000 each for using the bed of the Mississippi river for their lines. The court held that Arkansas had ownership of half the river bed and had title to land under all navigable waters in the state.

In making the decision, Judge G. B. Colvin Jr. agreed that the Army Corps of Engineers authorized the location of the pipelines. But, there had been no express authority from Congress for laying the lines and that the permits the firms had did not relieve them from obtaining the state's consent. He did say, however, that the lines were laid "in good faith and without the willful intention of violating any law."

The court called for "some legitimate method" for pipelines to cross such streams. Judge Colvin held that no state could erect any impassable barrier against interstate commerce along its borders and through it. But, he said, the state could provide for some regulation and control of such crossings and assess some form of privilege tax for the benefit of its citizens.

Such control, he said, could prevent the present situation where pipelines "are operating on the principle of first come first served, and selecting the sites of their crossing to suit their convenience."

United Fuel building

United Fuel Gas Co. can build 4.8 miles of 16-in. line and 8400 hp in compressor capacity (Docket G-18550).

The Charleston, W. Va., company will spend $3.5 million on the construction along its system near Huntington. This is part of the company's overall plan to replace portions of a low pressure transmission system.

FPC publishes statistics

FPC's 1958 edition of "Statistics of Natural Gas Companies" is for sale by the Superintendent of Documents, Washington 25, D. C.

The new report provides information on 91 companies, including detailed financial and operating data in the form of balance sheet statements; income and earned surplus statements; operating revenues, customers and sales; capital stock and long-term debt; operating expenses; and utility plant, gas accounting, and physical property data. Price is 60 cents per copy.

United Fuel gets permit

United Fuel Gas Co., Charleston, W. Va., has an FPC permit covering 18.5 miles of 26-in. line in Kanawha county, W. Va.

The $2.5 million line (Docket G-18358) is designed to help United meet its customers' demands and for the storage injection program in the Cobb operating area.

New college aid program

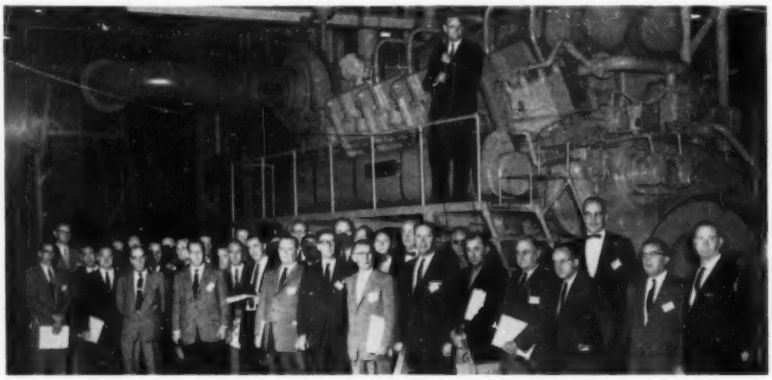
Tennessee Gas Transmission Co., Houston, has a new college aid program. When individual contributions are made by employees to eligible schools in the U. S., TGT will match the contribution.

To be eligible, an employee's contribution must have a value of not less than $10. The matching contribution will be limited to $500 per year per contributing employee.

Attaches new reserves

Westcoast Transmission Co. Ltd. has connected a new gas producing area to its gathering system. The successful drilling area is located about 90 miles north and west of Fort St. John in British Columbia. Pacific Petroleums Ltd. is doing the drilling.

It is expected that a number of wells will attain open flow ratings in the range of 30 MMcfd. Ten presently completed wells may have reserves of 400 billion cu ft of gas.



Thirty-seven pipeline company executives witnessed a demonstration of Clark Bros. new 4000-bhp TPV pipeline engine at the Clark factory in Olean, N. Y. The engine, of 2-cycle design, is also built in 4800- and 6400-bhp models. It is said to be the most powerful engine built for pipeline centrifugal compressor drive. The engine and a Clark centrifugal compressor are slated for early installation at Columbia Gulf Transmission Co.'s Hampshire, Tenn. station.

From the desk of **J.L. MARTIN**

Don—

Have you seen these latest figures on cathodic protection costs on pipelines? They're based on one mile of 24" pipe after several years of service—

Coating	Resistance (ohms/sq. ft.)	Installation	Annual Upkeep
Coal Tar Enamel	300,000+	$112.	$33.
"Economy" Enamel	10,000-	$2,740.	$520.

I'm convinced we can hardly afford to use anything but coal tar for our new line. Let's specify Pitt Chem Modified Coal Tar Enamel. I understand they make top quality products—and back them up with excellent technical field service.

Jim

★ PITT CHEM® Coal Tar Pipeline Enamels
★ PITT CHEM "Tarmastic"® Coal Tar Coatings
★ PITT CHEM "Tarset"® Coal Tar-Epoxy Resin Coatings
★ PITT CHEM "Insul-Mastic"® Gilsonite-Asphalt Coatings

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ALG seeks 15-year deals

Arkansas Louisiana Gas Co. wants to supply gas to 16 Arkansas industries for 15 years. It has asked the Arkansas PSC to approve contracts.

ALG would supply a maximum total of 38.9 MMcf a day to the companies. The rates are the same for each industry and the same as provided in other existing contracts.

United gets FPC approval

FPC okayed United Gas Pipe Line Co.'s plan to install 8.7 miles of 30-in. line. The new line, to cost about $2 million, will parallel part of United's existing line from the Agua Dulce field in Texas to Sterlington, La.

New distributor named

Blake Equipment Corp. is exclusive sales representative in southern New York and northern New Jersey for Daniel Orifice Fitting Co., Houston.

Blake headquarters in Englewood, N. J.

corrosion • *Continued*

from page 19

usually the contact between the electrode and the soil. This can be minimized in two ways; by using a cell having a large contact area, and by wetting the contact location. In extreme cases, it may even be profitable to use salt water for this wetting.

Often, as in conducting continuous soil potential profiles, it will be necessary to obtain pipe-to-soil readings at locations where the ground surface is covered by asphalt or concrete paving. This can usually be done by placing a shovel full of wet mud on the pavement and placing the electrode in the mud. An alternative solution is to use a large pad of coarse towelling, saturated with salt water. This is put on top of a thoroughly wetted area, and the electrode placed on the center of the pad. Even on concrete, this method can give a loop resistance as low as 1000 ohms, which is adequate for any of the more refined techniques described.■

Washington • *Cont'd.*

from page 17

The new Yukon well hit gas at 4400 ft, yielding flows of up to 10 MMcfd.

Although the road looks reasonably clear for Midwestern to eventually get the necessary export-import permits, travel is slow. The new Canadian Commission, using figures Chairman McKinnon has already reviewed as head of the Alberta agency, can probably come to a decision in a few months. In this country, the FPC was still ploughing through the case in late September, and was not expected to come to a decision much before the first of the year.

New IRS laws

THE cloud hanging over utility and other business promotional advertising will be lifted under regulations proposed by the Internal Revenue Service.

The new rules specifically permit continued tax deductions for so-called institutional advertising. But they would put tough new controls on deductions for advertising for lobbying or some "educational" purposes.

The new rules would specifically ban tax deductions for advertising in connection with lobbying, for the promotion or defeat of legislation, for political campaigns or candidates, or any related purposes.

This would include advertising aimed at influencing the public with respect to specific legislation or a referendum as well as to influence congressmen or local officials even though the outcome directly affects the taxpaper's business.

But expenditures for advertising designed to gain good will, keep the utility's name before the public, or to discuss general business, economic, financial, social or other subjects without regard to specific legislation is deductible. This also applies to urging readers to contribute to such groups as the Red

Undisputed Champion!

Allan Edwards

HEAVYWEIGHT

RIVERWEIGHTS

PUT YOUR

PIPELINE

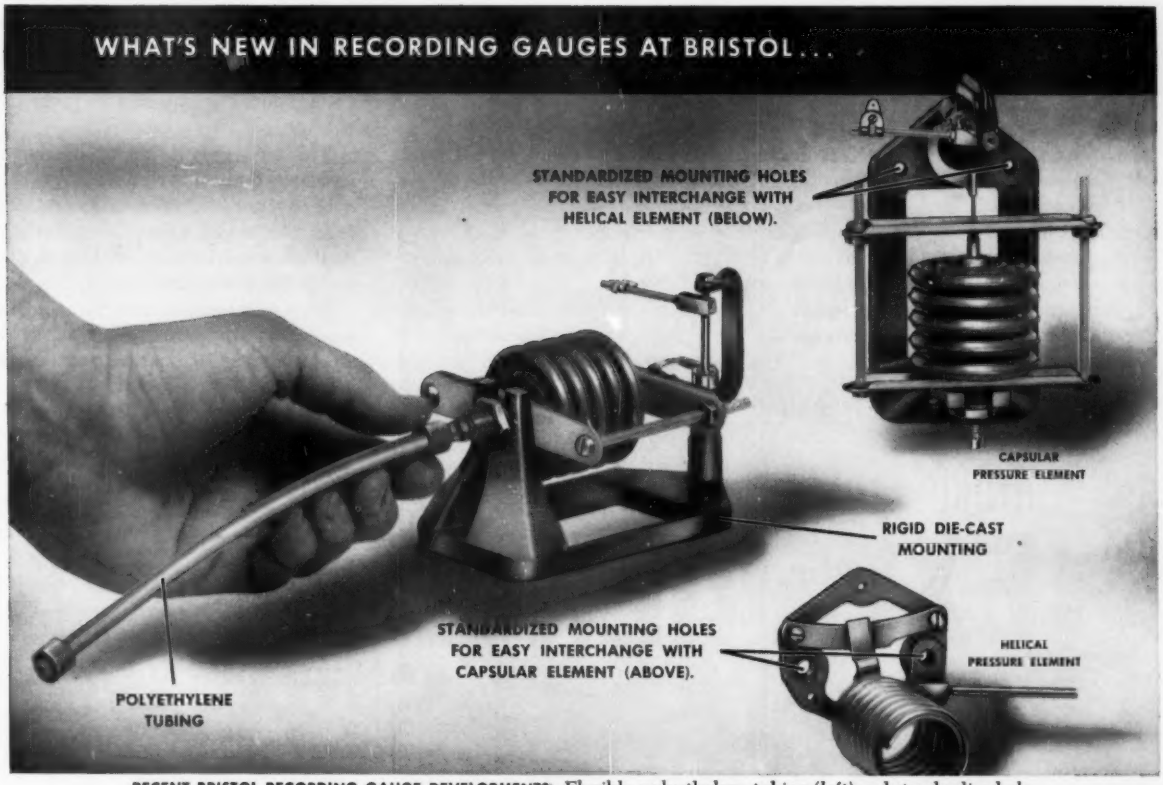
. . . DOWN FOR KEEPS

Allan Edwards, Inc., is the nation's oldest manufacturer of concrete river-weights. Weights are carefully designed and constructed to meet individual requirements. Weights can be constructed at your jobsite if tonnage warrants. Other fine Allan Edwards pipeline specialty products include . . .

WELDING SLEEVES • HALF SOLES • MARKER POSTS

Allan Edwards, Inc.

2445 S. Jackson—P. O. Box 7218, Tulsa, Oklahoma


WHAT'S NEW IN RECORDING GAUGES AT BRISTOL...
STANDARDIZED MOUNTING HOLES FOR EASY INTERCHANGE WITH HELICAL ELEMENT (BELOW).
CAPSULAR PRESSURE ELEMENT
RIGID DIE-CAST MOUNTING
STANDARDIZED MOUNTING HOLES FOR EASY INTERCHANGE WITH CAPSULAR ELEMENT (ABOVE).
HELICAL PRESSURE ELEMENT
POLYETHYLENE TUBING

RECENT BRISTOL RECORDING GAUGE DEVELOPMENTS. Flexible polyethylene tubing *(left)* and standardized element mountings simplify element interchange, provide increased mounting rigidity and vibration isolation.

Why are more Bristol Recording Gauges used than all others combined?

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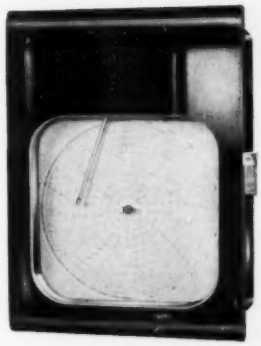
Flexible polyethylene tubing used to connect measuring elements. Simplifies interchange of elements, simplifies maintenance. Isolates element from shock and vibration.

Improved element materials. Capsular measuring elements are now available in **316 stainless steel and Ni-Span C,** as well as phosphor bronze. As a result, this type of measuring element, ideal for low pressures, can now be used for a large number of corrosive fluids. Helical elements are now available in **316 stainless steel and Ni-Span C, too,** as well as trumpet metal and beryllium copper.

Find out more about these latest Bristol gauges for recording, automatic control, pneumatic transmission and telemetering. Send for our 32-page catalog G621, today. The Bristol Company, 119 Bristol Road, Waterbury 20, Conn. 8.24



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Cross or to purchase U. S. Savings bonds.

The limitation on these deductions is that they be related to "the patronage the taxpayer might reasonably expect in the future" from the readers.

The proposed new regulations also clamp down on deductions to some trade groups and associations. They would permit dues or contributions to labor organizations or trade associations to be deducted in full unless a "substantial part" of the organization's activities consist of lobbying or legislative propaganda.

In these cases, only that part of the dues which can be shown to go for other activities can be deducted.

This latest IRS proposal was a sharp shift from an earlier rule which cast a heavy legal cloud on the deductibility of all institutional advertising.

It stems in part from the fight over natural gas legislation two years ago, when gas producers and others in the industry kicked more than $1 million into a special organization which conducted an "educational" campaign in favor of the bill.

This new regulation would make it clear that the contributions to such a fund would not be deductible, nor would advertising for or against such legislation placed directly by a company.

Under normal procedures, the new rule would go into effect before the first of the year if it is adopted.

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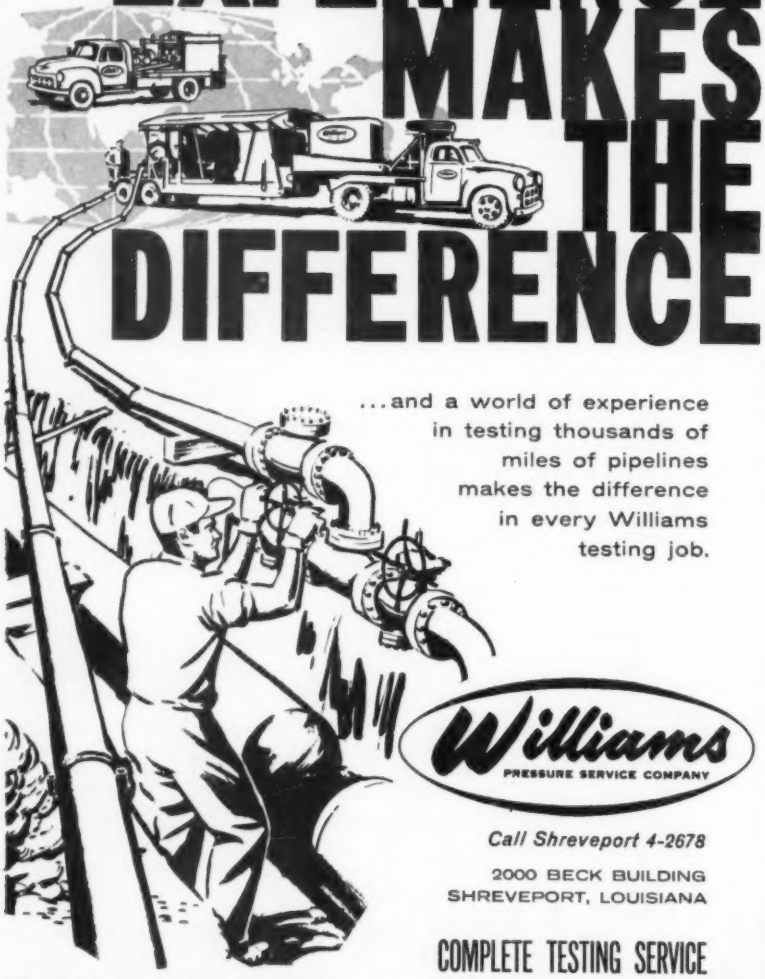

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regulatory • *Cont'd.*

from page 12

prices, the commission certificated Gulf Interstate Gas Co. with the knowledge that it was paying producers in southern Louisiana an initial price of 20 cents with fixed escalations each year. In 1954, FPC certificated producers supplying American Louisiana at 20 cents per Mcf and in October 1955, it certificated producers supplying gas to Texas Gas at a price of 20 cents per Mcf. A staff exhibit in this case, which sets forth other sales made in this area and certificated by FPC under contracts executed prior to the commision's CATCO decision of June 24, 1957, shows prices equal to or higher than those applied for in the Hope proceeding.

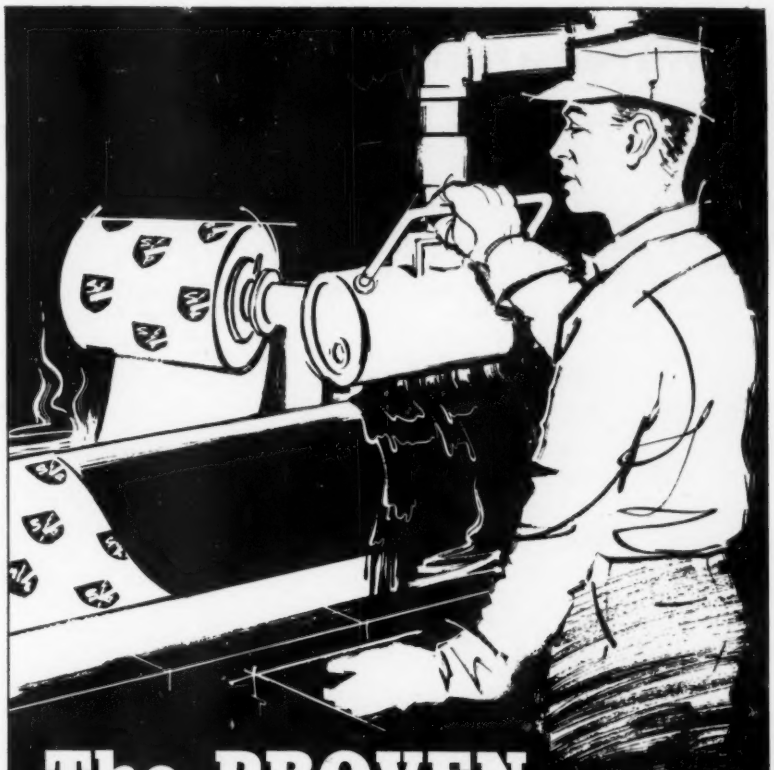
In comparing 1953 and 1954 prices with present prices, FPC kept in mind that the natural gas production business, like other businesses, has been subject to inflation and increased labor and material costs. Thus, if there has been an increase for natural gas producers in the cost of doing business of 20 per cent between 1954 and 1959, a price of 20 cents in 1954 is comparable to a price of 24 cents in 1959. In making this comparison, FPC made it clear that it was doing so only for the purpose of showing that a price of 21.5 cents per Mcf, under the circumstances is not out of line with previously certificated prices when the effects of inflation are considered. The commission warned: "We shall consider any new application based upon a price in excess of any price we have heretofore

certificated to be 'out of line' and shall require conclusive proof from the applicant that the public convenience and necessity requires certification at that price."

In considering whether or not the proposed price to Hope was out of line with other prices in the south Louisiana area, FPC also considered the fact that most of the gas involved is produced either offshore or in the bayous which are almost inaccessible, and where drilling operations are much more expensive than on dry land. FPC noted that this gas is obtained from deep horizons which are located at depths of 10,000 to 13,000 ft.

The commission found nothing in the evidence that signaled the existence of a situation which would indicate that the issuance of a permanent certificate was not in the public interest. The proposed price was not out of line with other prices currently being charged in Louisiana, nor was it out of line with the pre-Catco prices, particularly when one considers the increase in the costs of producing gas, the location of the fields involved and the depth of the sands from which the gas is produced. Certification at these prices FPC said: ". . . . will not result in any triggering, there will be no increase in Hope's existing rates to its customers, nor will there be any increase in the weighted average cost of Hope's gas."

FPC focused on the public interest and declared that: ". . . . considering the need of Hope for this gas, the fact that it has been unsuccessful in locating gas for its customers in its own exploration activities in south Louisiana and has been unable to purchase any at a lesser price than it is here paying, that the prices will be relatively firm for at least 8, and sometimes for 12 years, that none of its customers has raised any question as to the producer prices and the fact that every other aspect of the public convenience and necessity has been met, we conclude that the public convenience and necessity requires the issuance of the producer applications at the proposed prices. To deny these supplies to Hope would be a disservice to all of the consumers dependent upon it for their gas." ■



The PROVEN METHOD for PIPEPROTECTION

The essence of pipeprotection is a perfect bond of the coatings and wrappings to the pipe and to each other. This bond must be maintained under all conditions — when the pipe is bent and during wide temperature variations. Otherwise, the coatings and wrappings would slip and creep and holidays would occur, permitting corrosive action on the pipe.

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GAS Pipeline People

HOWARD D. HENDERSON, manager of production and supply, and BURTON T. MAST, chief engineer, are newly elected vice presidents of Trunkline Gas Co., Houston. Mast has been chief engineer for Trunkline since 1954. Prior to joining Trunkline he was an engineer with Tennessee Gas Transmission Co. Henderson has been with Trunkline since 1956 as production and supply manager.

LUSTER VONTATE has been promoted to chief engineer at United Gas Pipe Line Co.'s Sarepta compressor station in the Shreveport district. He formerly was an engineer at Longview, Texas.

C. G. CAMPBELL has retired as assistant treasurer of Transcontinental Gas Pipe Line Corp., Houston. He has been in public utility financial and accounting work for 36 years. He joined Transco in 1949 during construction of the 1800-mile line to New York.

JACK KOHL is manager of the western sales region of Black, Sivalls & Bryson's Controls division. He will headquarter in Los Angeles. Kohl has been serving as Philadelphia district sales manager since 1957.

H. R. ROHWEDDER has been named assistant director of operations and J. G. BARNHART assistant general superintendent of compressor stations of Natural Gas Pipeline Co. of America and Texas Illinois Natural Gas Pipeline Co. Both men joined the older NGPL firm in 1930 during construction of the Texas Panhandle-to-Chicago line. Rohwedder formerly was superintendent of TING compressor stations; Barnhart was superintendent of NGPL compressor stations.

O. R. STITES, general attorney and member of the board of Cities Service Gas Co., Oklahoma City, has retired after nearly 21 years with the company.

W. A. HOLCOMB, JR., is now manager of the insurance and pensions department of Transcontinental Gas Pipe Line Corp., Houston. The former assistant manager of the department has been with Transco for eight years.

KENNETH W. YODER has been appointed assistant manager of Texas Eastern Transmission Co.'s Division I at North Little Rock. He was formerly the division engineer.

Foxboro Co., Foxboro, Mass., has formed a systems engineering group specializing in advanced application engineering phases of computer control in the process industries. ROBERT SILVA, formerly of the systems engineering division, heads the new group.

A. E. DJERF is district manager of the Southwest district of U. S. Steel's Consolidated Western Steel Division. He will headquarter in Phoenix, succeeding F. M. ASPEY, who will concentrate on sales activities in the Southwest district.

CARL R. SISSON, formerly manager of Texas Eastern Transmission Corp.'s Division III in Westchester, Pa., has been named manager of operations for the company's Little Big Inch division. He will headquarter in Houston.

WILLIS DITMANSON has been named national parts and service manager for Motorola Communications & Electronics Inc., Chicago.

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Charles Herrin
Motorola

L. B. Hume
Cooper

BOB J. BEARD has been promoted to director of the natural gas and pipeline department in Delhi-Taylor Oil Corp.'s special projects and planning division in Dallas. He holds the post of vice president of Delhi Pipeline Co.

MARINO R. ANDERSON has been named export sales representative for Lone Star Steel Co., Dallas.

ROBERT M. WOOLFOLK, JR., has been appointed manager of manufacturing of Texas Gas Corp., Houston. He has served as assistant manager of that department since May. He joined Texas Gas in 1957 as chief engineer.

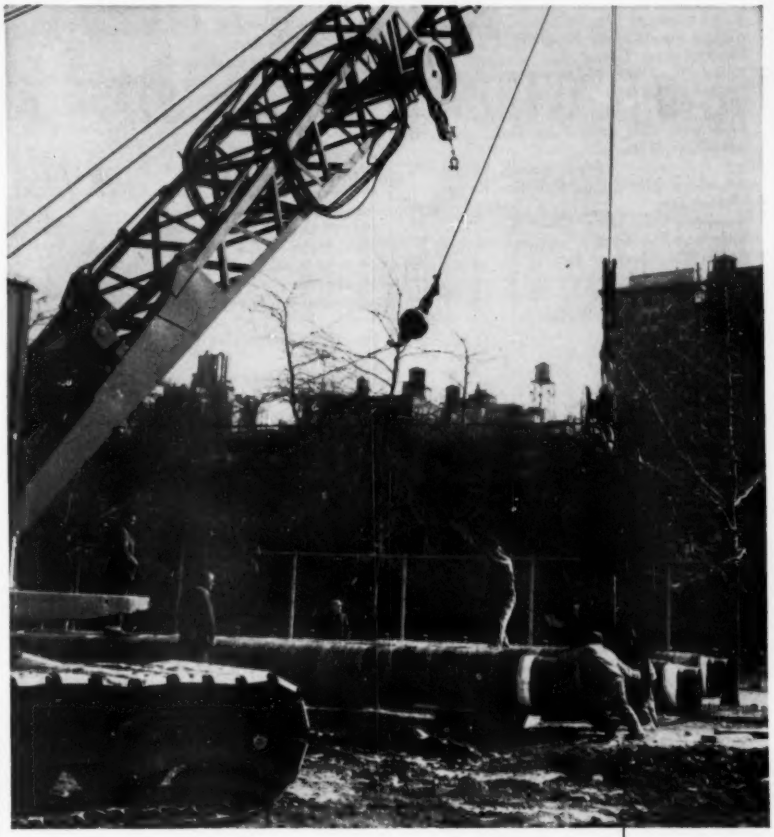
LAURENCE B. HUME was promoted to assistant manager, power engine sales by Cooper-Bessemer Corp., Mount Vernon, Ohio. With Cooper-Bessemer since 1940, Hume has been in the Washington, D. C., sales office.

R. U. HACKENJOS joined the sales staff of Tube Turns division of Chemetron Corp., Louisville. He formerly was with Sweco Inc. in Houston, from which Tube Turns recently acquired the new product line.

DR. CLIFFORD W. SEIBEL, formerly assistant director of the U. S. Bureau of Mines in charge of helium activities, is joining Stearns-Roger Manufacturing Co., Denver.

CHARLES HERRIN is now sales manager, two-way radio products, for Motorola Communications & Electronics Inc., Chicago. His territory covers a 10-state western area: Washington, Oregon, California, Idaho, Nevada, Wyoming, Montana, Colorado, Utah and Arizona.

New Hudson River crossing, part of Transco's $100,000,000 construction program for 1959.



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ACF Industries Inc., W-K-M Div. 120
Adams Pipe Repair Products —
Air Preheater Corp. 135
Allied Chemical, Plastics & Coal Chemicals Div. —
Allis-Chalmers Mfg. Co. —
American Cast Iron Pipe Co. 49
American Meter Co. Front Cover, 90, 91, 98
American Meter Co., Reliance Regulator Div. Second Cover
American Recording Chart Co. 93
American-Standard 97
Apco Div., Textron Inc. 20
Aqua Survey & Instrument Co. —
Arkla Air Conditioning Corp. —
Auburn Machine Works —

Barber-Greene Co. —
Baso Inc. —
Bethlehem Steel Co. —
Bilco Co. —
Black, Sivalls & Bryson, Inc. Third Cover
Blaw-Knox Co. 124, 125
Bonded Products Inc. —
Bonney Forge & Tool Works 99
Borg-Warner Corp., Marbon Chemical Div. 32
Bristol Co. 141
Brooks Products Inc. —
Bucyrus-Erie Co. —
Busada Supply Co. Inc. —
Byers Co., A. M. —

Capitol Mfg. & Supply Co. —
Cast Iron Pipe Research Assn. 36, 37
Cathodic Protection Service —
Chaplin-Fulton Mfg. Co. 9
Chevrolet Motor Div., General Motors Corp. —
Cleveland Trencher Co. —
Connelly, Inc. —
Controls Co. of America —
Cooper-Bessemer Corp. 128, 129
Coast Paint & Lacquer Co. —
Cosa Corp. —
Crose Mfg. Co., M. J. —
Cutler-Hammer Inc. 51

Daniel Orifice Fitting Co. —
Darling Valve & Manufacturing Co. —
Davey Compressor Co. —
Day Co., S. D. —
Dollinger Corp. 42
Dover Corp., Peerless Mfg. Div. 44
Dresser Industries, Inc. —
Clark Bros. Co. —
Dresser Manufacturing Div. 78, 79
Roots-Connersville Blower Div. 21

Eastman Chemical Products —
Ebasco Services, Inc. —
Edwards Inc., Allan 140
Electro Rust-Proofing Corp. 94
Emhart Manufacturing Co., Maxim Div. —
Empire Gas Engineering Co. 95

Fisher Governor Co. 30, 31
Fisher Research Laboratory, Inc. —
Flexonics Corp. —
Ford Motor Co. —
Foxboro Co. 127

Garrett Oil Tools, Inc. 137
Gas Equipment Manufacturers Committee —
General Controls 35
General Electric Co. 55
General Motors Corp., Chevrolet Motor Div. —
Good-All Electric Mfg. Co. —
Goodrich Chemical Co., B. F. 38
GPE-Controls Inc. —
Grabler Manufacturing Co. 5
Grayson Controls Div., Robertshaw-Fulton Controls Co. 1
Grove Valve & Regulator Co. 48

Hallen Construction Co. —
Handley-Brown Co. 29
Hardwick Stove Co. —
Hays Manufacturing Co. 77
Heath Survey Consultants Inc. 98
Hill, Hubbell Co. —
H & M Pipe Beveling Machine Co. —
Holan Corp. 50
Homestead Valve & Manufacturing Co. —
Houston Contracting Co. —

International Harvester Co. —

Jaeger Machine Co. —
Johns-Manville Corp. —
Johnson-Williams Inc. —

Ka-Mo Tools Dept., Kwik-Mix Co. —
Koenig Iron Works, Inc. —
Koppers Co., Inc., Metal Products Div. —
Kraloy Plastic Pipe Co., Inc. —
Kwik-Mix Co., Ka-Mo Tools Dept. —

Laclede Steel Co. —
Lancaster Meter Parts Co. 86
Ledeen Manufacturing Co. 4
Lone Star Steel Co. 3

Marbon Chemical Div., Borg-Warner Corp. 32
Mavor-Kelly Co. —
Maxim Div., Emhart Manufacturing Co. —
Maxitrol Co. 14
Mav Products, Inc. 100
McCabe-Powers Body Co. —
McDonald Mfg. Co., A. Y. 97
Mercoid Corp. 100
Midwestern Pipe Line Products Co. —
Minneapolis-Honeywell Regulator Co. 22, 23
Minnesota Mining & Mfg. Co. 56
Motorola Communications & Electronics, Inc. —
Mueller Co. 26, 27, 33

National Tank Co. —
National Tube Div., U. S. Steel Corp. 34
Natural Gas Odorizing Inc. 16
Naugatuck Chemical Div., U. S. Rubber Co. —
Nordstrom Valve Div., Rockwell Manufacturing Co. 24, 25
Norton-McMurray Manufacturing Co. 76

Onan & Sons, Inc., D. W. —
Oronite Chemical Co. —

Parker Seal Co. 28
Parkhill Truck Co. —
Parsons Co. 89
Peerless Manufacturing Co. 81
Peerless Mfg. Div., Dover Corp. 44
Perrault Equipment Co. —
Pipe Fabricating & Supply Co. —
Pipelife Process Corp. —
Pipe Line Service Corp. —
Pittsburgh Coke & Chemical Co. 139
Polyken Products Div., Kendall Co. 18
Pritchard & Co., J. F. —
Production Plating Works Inc. —

Radiator Specialty Co. 100
Reed Manufacturing Co. —
Reliance Regulator Div., American Meter Co. Second Cover
Republic Steel Corp. 40, 41
Reynolds Gas Regulator Co., Inc. 88
Ridge Tool Co. 87
Robertshaw-Fulton Controls Co., Grayson Controls Div. 1
Thermostat Div. 39
Rockwell Manufacturing Co. Gas Products Div. —
Instrument Div. 47
Nordstrom Valve Div. 24, 25
Roots-Connersville Blower Div. Dresser Industries, Inc. 21
Royal McBee Corp. 45
Royston Laboratories Inc. 123

Safety Gas Main Stopper Co. 93
Seamless Rubber Co. —
Security Valve Corp. —
Shell Chemical Corp. —
Sherman Products Inc. 43
Skinner Co., M. B. 13
Smith Corp., A. O. 130, 131
Smith Manufacturing Co., A. P. —
Somerville Construction Co. —
Southern Cross Foresters 92
Southern Pipe Div., U. S. Industries —
Speedy Therm Service Co. 76
Sprague Meter Co. Fourth Cover
Stafford Co., R. W. 144
Standard Electric Time Co. —
Standard Magnesium Corp. 96
Standard Pipeprotection, Inc. 143
Studebaker-Packard Corp. 53
Sun Shipbuilding & Dry Dock Co. —
Superior Meter Co. 10

Tapecoat Co. 102
Tennessee Gas Transmission Co. —
Textron Inc., Apco Div. 20
Tex-Tube Inc. —
Thermac Co. —
Tinker & Rasor —
Transcontinental Gas Pipe Line Corp. 145

Union Malleable Mfg. Co. 7
Union Switch & Signal Div. Westinghouse Air Brake Co. 132, 133
United Engineers & Constructors —
U. S. Industries Garrett Oil Tools Inc. 137
Southern Pipe Div. —
U. S. Pipe & Foundry Co. 46
U. S. Rubber Co., Naugatuck Chemical Div. —
U. S. Steel Corp., National Tube Div. 34
Universal Controls Corp. 98

Valley Manufacturing Co. —
Vermeer Manufacturing Co. —
Vulcan Rubber Products, Inc. 75

Walworth Co. —
Warren Petroleum Corp. 144
Westinghouse Air Brake Co., Union Switch & Signal Div. 132, 133
White Motor Co. —
Wilcolator Co. 52
Will, David C. —
Williams Pressure Service Co. 142
Williamson, Inc., T. D. —
W-K-M Div, ACF Industries Inc. 120
Wood Co., John 54
Worthington Corp. —

Youngstown Sheet & Tube Co. 112, 113

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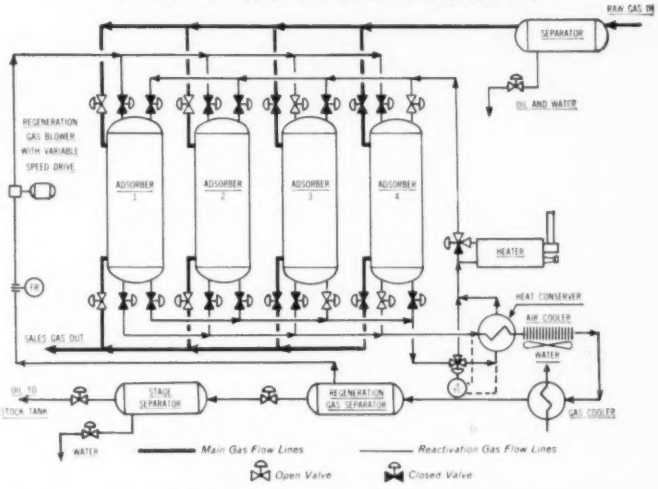
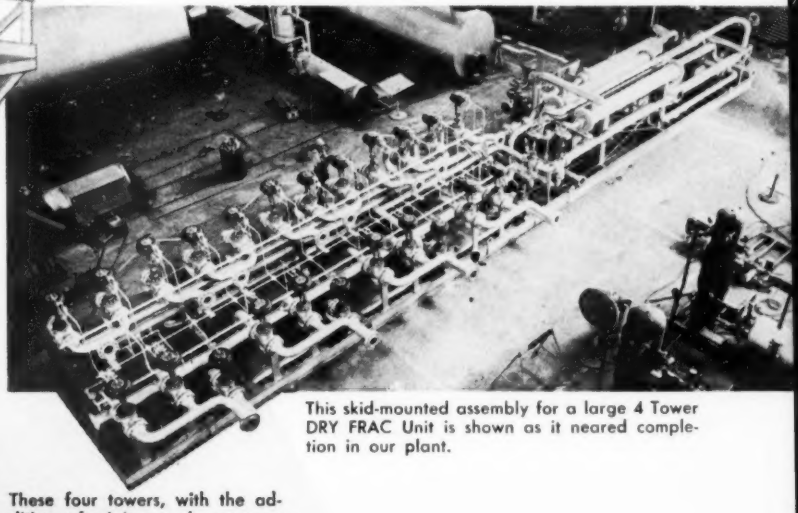


Flow diagram of a typical 4 Tower DRY FRAC Unit With Closed Cycle Regeneration. Smaller diameter towers and smaller valves of standard sizes contribute to reduction in cost of this type unit.



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